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**Bulletin of the
British Museum (Natural History)**

The sandflies of Egypt (Diptera: Phlebotominae)

R. P. Lane

Entomology series
Vol 52 No 1

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The sandflies of Egypt (Diptera: Phlebotominae)

R. P. Lane

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Cromwell Road, London SW7 5BD

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Synopsis

The medical importance of, and previous studies on, the sandflies of Egypt are reviewed. Phlebotomine sandflies transmit phlebotomus fever (= sandfly fever) and two forms of leishmaniasis to man in Egypt. The number of species known from Egypt is increased from seven to 21 (8 *Phlebotomus*, 13 *Sergentomyia*). Following an identification key, a diagnosis is given for each species together with a discussion of taxonomic and biological data, including vector status. The Egyptian sandfly fauna is composed of three faunal elements, one clearly Palaearctic, the others Afrotropical but having particular affinity to the sandflies of the Arabian peninsula.

Introduction

The study of the phlebotomine sandflies of Egypt, including the Sinai peninsula, is important for two reasons: these flies act as vectors of pathogenic organisms there (phlebotomus fever virus and two species of *Leishmania*) and secondly, the area in which they occur is an important interface between the Palaearctic and Afrotropical zoogeographic regions. In a review of leishmaniasis in the eastern Mediterranean, Zahar (1980: 11) commented on the dearth of knowledge of Egyptian sandflies and recommended that a 'thorough revision of the sandfly fauna' should be made.

The principal objective of this paper is to provide descriptions and keys to the sandflies of Egypt and indicate established or potential vectors of disease, thus facilitating future studies on their biology and assessment of their medical importance in the area. The biogeographical relationships of the fauna are discussed in relation to other parts of the Middle East and Africa. Before dealing with the taxonomy of the phlebotomines, a review of the pertinent literature is made. This is divided into the medical importance of phlebotomines and previous taxonomic studies.

Medical importance of sandflies in Egypt

In Egypt phlebotomine sandflies are important as vectors of phlebotomus fever virus and two species of *Leishmania*: *Le. major* and *Le. donovani*, the causative agents of cutaneous and visceral leishmaniasis respectively.

Phlebotomus fever (sandfly fever) is a systemic and well-studied febrile disease of man and is

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* WHO Collaborating Centre for the study of Phlebotomine sandflies in relation to leishmaniasis.

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endemic in many parts of Egypt (Schmidt *et al.*, 1971; Darwish & Hoogstraal, 1981; Taylor, 1958). *Phlebotomus papatasi* was incriminated as the vector in Egypt by Schmidt *et al.* (1960) who isolated the virus from flies collected in human dwellings in suburban Cairo. Phlebotomines may also be vectors of another viral fever, Rift Valley Fever. RVF is an arthropod-borne disease which usually attacks domestic ungulates but, more importantly, has caused considerable human disease and mortality in two recent outbreaks in Egypt (Meegan, 1979; Hoogstraal *et al.*, 1979). The vector of RVF virus has not been discovered yet, although mosquitoes are thought to be the most likely, particularly *Culex pipiens* (Meegan *et al.*, 1980). However, authors regularly state that *Phlebotomus* species should still be examined as potential vectors in view of their abundance and distribution throughout the affected areas. This cautious view is supported by Hoch & Bailey's (1983) findings that five out of 34 attempts to transmit mechanically RVF virus to hampsters by using sandflies (*Lutzomyia longipalpis*) were successful.

Until recently, neither cutaneous nor visceral leishmaniasis was considered common in Egypt as they were only known from occasional cases diagnosed clinically. Cutaneous leishmaniasis had been recorded by Khalil (1934), Halawani (1940) and Cahill *et al.* (1966) who found an area where *Le. tropica* is endemic in the Hihya district of Sharqiya Governate. Cahill (1965) also made a leishmanin skin test survey in various villages of the Nile Delta and found that most positive cases were either in Sharqiya Governate or originated there. In a sample of 612 patients in the Faquus area of the governate, 17% of those tested were positive (i.e. had been challenged by *Leishmania*) with an equal sex distribution. However, recent studies by Soliman & Abo-Shady (1981), Morsy *et al.* (1982) and Rifaat *et al.* (1983*a*, 1983*b*) have shown cutaneous leishmaniasis to be more widespread and common than previously thought. The sandfly *P. papatasi* is a common peridomestic species throughout Lower Egypt and is probably the vector of *Le. major* there as it is in neighbouring Israel (Schlein *et al.*, 1982, 1984; Adler & Theodor, 1925). Furthermore, *P. papatasi* was the only *Phlebotomus* species caught in a survey in Sinai (30° 50′N, 34° 20′E) where cutaneous leishmaniasis is common amongst members of the Multinational Peacekeeping Forces. *P. papatasi* is probably the vector there also as this area of Sinai is a very similar habitat to that described by Schlein *et al.* (1984) who are working in the Negev and central Arava regions of Israel, which are contiguous with northern Sinai. Some cases of cutaneous leishmaniasis have recently been recorded formally from southern Sinai (Bassili *et al.*, 1983), but it is undoubtedly more prevalent there as numerous cases are known from central Sinai (J. Zimmerman, pers. comm.) and along the coast of the Red Sea and Gulf of Aqaba of Saudi Arabia (R. Cross, pers. comm.). In southern Sinai several vector species other than *P. papatasi* have been found (see below). To date, there have not been any isolations of *Leishmania* from wild-caught sandflies in Egypt and therefore any suggestion that a species is a vector must be speculative, although the circumstantial evidence for *P. papatasi* is considerable.

Until recently, the only autochthonous cases of visceral leishmaniasis recorded from Egypt were those of Phillips (1904), who found that 32% of patients with splenomegaly in a Cairo hospital had *Leishmania* bodies detected in smears following spleenic puncture. The case described by Hassan (1968*b*) was thought to be imported from Saudi Arabia. Cahill (1968) reports that no visceral infections were found in an extension of his earlier leishmanin survey (Cahill, 1965) to different ecological zones of Egypt. Rifaat *et al.* (1968) examined potential reservoirs (443 dogs and 324 rodents) and 'vectors' (*P. papatasi* and *P. sergenti*) of visceral leishmaniasis in 13 'indicator areas' of Egypt but did not find any infected with *Leishmania*. However, Morsy *et al.* (1982) found that 21·3% of *Rattus norvegicus* and 12% of *R. rattus* reacted positively in serological tests for *Leishmania* in Ismailiya Governate. Subsequently, smears from only one *R. norvegicus* and four *R. rattus* were found to have *Leishmania* bodies, but this was sufficient evidence to consider the rats to be reservoirs of the disease. Recently, Tewfik *et al.* (1983) detected a case of infantile visceral leishmaniasis from Al Agamy, near Alexandria. Subsequently, 20 patients have been detected (to June 1984) and the parasite identified as *Le. donovani donovani* (Mansour *et al.*, 1984). Al Agamy is an area of new housing development on a narrow limestone strip between the Mediterranean and a large brackish lake. There is very little vegetation around the patients' houses other than small fig orchards. Intensive sandfly collecting in and around houses produced only two species of *Phlebotomus*:

P. papatasi and *P. langeroni* (J. Beier, H. Kassem and B. Sawaf, pers. comm.). Sawaf *et al.* (1984) have suggested that *P. langeroni* is the most likely vector species, for two reasons: it is a close relative of *P. orientalis* Parrot, a well-established vector of visceral leishmaniasis in Sudan, and *P. papatasi* is the only other *Phlebotomus* species present and is known to be a poor vector of *Le. donovani* (Lewis & Ward, in press). The unlikely possibility remains that the vector is neither of these species but another, such as *P. tobbi* Adler & Theodor, living well away from human dwellings.

Previous studies of Egyptian sandflies

Previous studies of the sandfly fauna of Egypt have been fragmentary, and the Sinai and upper Egypt have not been studied at all. Willcocks (1917) recorded the ubiquitous vector species *P. papatasi* from lower Egypt and in 1948 Theodor recorded another anthropophilic species, *P. sergenti*, from metropolitan Cairo. Khalil (1934) reported *Sergentomyia squamipleuris* from Sharkiya Governate during a leishmaniasis study. Zein el Dine (1972) made the first attempt at a phlebotomine survey in Egypt, concentrating on the Bahariya, Kharga and Dakhla oases, but only found *P. papatasi* and *S. palestinensis*. She also reports the collection of *S. minuta*, a common Mediterranean species, by Eflatoon in 1922. During a survey to find visceral leishmaniasis vectors, Rifaat *et al.* (1968) added *S. tiberiadis* to the faunal list. Recently, *P. langeroni* has been discovered at Al Agamy, a focus of visceral leishmaniasis near Alexandria (Sawaf *et al.*, 1984), bringing the known sandfly fauna to seven species: three *Phlebotomus* and four *Sergentomyia*. Based on recent collecting and material in the British Museum (Natural History), the present study increases this to 21 species: eight *Phlebotomus* and 13 *Sergentomyia*. No comprehensive taxonomic work exists facilitating the identification of these species.

Materials and methods

Specimens for this study of Egyptian sandflies came from several sources and were collected by a variety of methods. Details of the methods used by early collectors such as Omer-Cooper, who collected in Siwa Oasis in 1909, are not available. However, the methods of recent collectors who submitted material for identification are available. Rifaat (Cairo) and Braverman (Israel) both used CDC light-traps (with incandescent, not fluorescent, bulbs) in epidemiological surveys, the first in a visceral leishmaniasis survey, the second during a search for Rift Valley Fever vectors. The author's collections were made with sticky traps, with a small lightweight chemical light-trap, and by aspirating from walls and inside animal houses.

With the exception of the *P. sergenti* material collected by Theodor and mounted in Balsam, all specimens were mounted in Berlese medium. The head was removed from the body and mounted ventral side uppermost in a thin film of medium, thus allowing examination at high magnification. The body was mounted laterally under a separate coverglass. It was necessary to remount many female specimens to show the spermathecae which were usually obscured by developing ova or fat-body. The specimens were immersed in a 1% detergent solution for up to 24hrs to remove fat; ova, if present, were dissected out.

Abbreviations

DEPOSITORIES

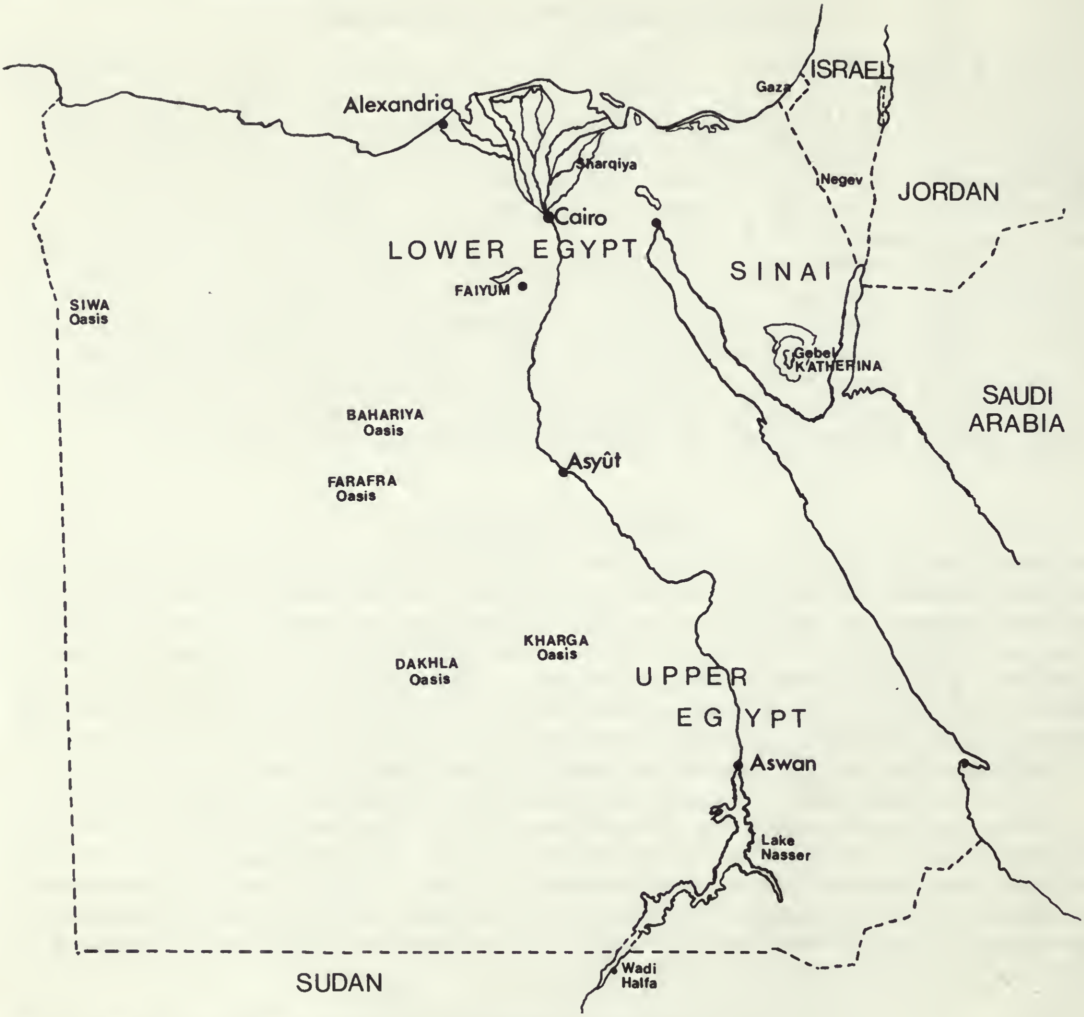
BMNH	British Museum (Natural History), London, U.K.
FM	Laboratoire de Parasitologie, Faculté de Médicine, Paris, France.
IPA	Institut Pasteur, Algiers, Algeria.
IPH	Institute of Public Health, Teheran, Iran.
MI	Institute of Tropical Medicine and Parasitology, Moscow, U.S.S.R.
U,Pavia	University of Pavia, Italy.

NAMES OF COLLECTORS MENTIONED

K.Z.D.	K. Zein el Dine
M.A.R.	M. A. Rifaat
R.P.L.	R. P. Lane
Z.A.H.	Z. A. Hassan
Y.B.	Y. Braverman

VARIOUS

A3, A4 etc.	Antennal segment 3, 4, etc.
Le.	*Leishmania*



Map 1 The principal towns, oases and areas mentioned in the text.

Composition and distribution of the sandfly fauna in Egypt

	LOWER EGYPT	UPPER EGYPT	SOUTHERN SINAI
Phlebotomus alexandri Sinton	–	–	*
P. arabicus Theodor	–	–	*
P. kazeruni Theodor & Mesghali	–	–	*
P. langeroni Nitzulescu	*	–	–

	LOWER EGYPT	UPPER EGYPT	SOUTHERN SINAI
P. major Annandale 'Sinai form'	–	–	*
P. orientalis Parrot	–	–	*
P. papatasi (Scopoli)	*	*	–
P. sergenti Parrot	*	–	*
Sergentomyia adleri (Theodor)	–	–	*
S. antennata (Newstead)	*	–	–
S. christophersi (Sinton)	–	*	–
S. cincta (Parrot & Martin)	*	–	–
S. clydei (Sinton)	–	–	*
S. fallax (Parrot)	–	–	*
S. minuta (Rondani)	?	–	–
S. palestinensis (Adler & Theodor)	–	*	*
S. schwetzi (Adler, Theodor & Parrot)	–	*	*
S. squamipleuris (Newstead)	*	*	–
S. taizi Lewis	–	–	*
S. theodori (Parrot)	*	–	–
S. tiberiadis (Adler, Theodor & Lourie)	–	*	–

* denotes presence of a species.

Key to the species of Phlebotominae in Egypt

1 Female without cibarial armature or pigment patch; male with four or five spines on style; all abdominal sclerites with erect hairs (***PHLEBOTOMUS***) 2

– Female with cibarial armature and pigment patch present; male with four spines on style; abdominal sclerites with recumbent hairs only, except in subgenus *Sintonius* (***SERGENTOMYIA***) 16

2 Males 3

– Females 9

3 Style with five short tooth-like spines (Fig. 39), surstyle with spines apically, paramere with three lobes.
Small basal tubercle on coxite with non-deciduous hairs .... **papatasi** (p. 15)

– Style with five long spines, surstyle without spines apically, paramere simple 4

4 Coxite with basal lobe bearing long hairs 5

– Coxite without basal lobe 7

5 A3 short and thick (Fig. 8). Plunger of sperm pump not much wider than barrel (Fig. 11), barrel not much longer than wide. Basal coxite tuft short and broad (Fig. 10) .... **alexandri** (p. 9)

– A3 long (Fig. 41). Plunger of sperm pump wider than barrel, barrel longer than wide (Fig. 43). Basal coxite tuft long and slender (Fig. 17) 6

6 Style less than half length of coxite, mesonotum pale .... **sergenti** (p. 17)

– Style about half length of coxite, mesonotum dark .... **kazeruni** (p. 9)

7 Aedeagus with keel just before tip (Fig. 6); coxite with hair group of more than 30 hairs; sperm ducts with transverse ridges, more than eight times pump length .... **arabicus** (p. 7)

– Aedeagus smooth to tip; hair group less than 20 hairs; sperm ducts smooth, less than 5 times pump length 8

8 Two ascoids on antennal segments 8–12 .... **langeroni** (p. 11)

– One ascoid on antennal segments 8–12 .... **orientalis** (p. 13)

9 Spermathecae with single segmented capsule.
Pharynx narrow, with scale-like armature, posterior margins of hind scales minutely serrated (Fig. 15) .... **kazeruni** (p. 9)

– Spermathecae either indistinctly (Fig. 5) or distinctly segmented (Fig. 34) 10

10 Spermathecae indistinctly segmented (Fig. 5) .... **arabicus** (p. 7)

– Spermathecae distinctly segmented 11

11 Pharyngeal armature composed of broad scale-like teeth (Fig. 7) 12

– Pharyngeal armature composed of rows of minute teeth or ridges (Fig. 38) 13

12 Pharynx triangular, lateral and posterior margins straight (Fig. 7); ascoids on A3 and A4 short and stout (Fig. 8); combined length of A3 + A4 shorter than labrum .... **alexandri** (p. 9)

– Pharynx indented posteriorly (Fig. 40); ascoids on A3 and A4 long and slender, almost reaching end of segment (Figs 41, 42); combined length of A3+A4 longer than labrum ***sergenti*** (p. 17)

13 Pharyngeal armature extending to half length of pharynx (Fig. 32) .... ***major*** ‘Sinai form’ (p. 12)

– Pharyngeal armature not extending beyond posterior third of pharynx 14

14 Spermathecae with segments subequal, apical segment short (Fig. 37) .... ***papatasi*** (p. 15)

– Spermathecae with segments unequal in size, middle segments larger than others, apical segment long (Fig. 26) 15

15 Ascoids on A4 more than 0·5 length of segment (Fig. 20).......... ***langeroni*** (p. 11)

– Ascoids on A4 less than 0·4 length of segment (Figs 21, 22) .... ***orientalis*** (p. 13)

16 Males 17

– Females 28

17 Aedeagus finger-shaped, with blunt rounded tip (Fig. 67).......... 18

– Aedeagus with straight tapering sides, pointed (Figs 53, 64).......... 23

18 Aedeagus curved downwards towards surstyle (Fig. 67).......... 19

– Aedeagus straight or curved upwards 21

19 Style with two apical and two subapical spines (Fig. 64).
Cibarial teeth irregular, outer teeth only slightly larger than central teeth, pharyngeal armature a series of fine transverse ridges .... ***schwetzi*** (p. 23)

– Style with all spines apical.......... 20

20 Outer cibarial teeth scale-like, very much larger than central teeth .... ***taizi*** (p. 25)

– All cibarial teeth small, outer teeth same size as central teeth.
Aedeagus tapering .... ***minuta*** (p. 21)

21 Cibarium with 18–22 teeth, the central teeth distinctly smaller than lateral teeth .... ***theodori*** (p. 25)

– Cibarium with 16–18 subequal teeth.......... 22

22 Style slender, five to seven times as long as wide (Fig. 58), accessory seta on style close to apical spines .... ***fallax*** (p. 21)

– Style stout, four times as long as wide (Fig. 57), accessory seta at about 0·75 style length ***antennata*** (p. 19) and ***cincta*** (p. 20)

23 Aedeagus truncated (Fig. 64), style with two subterminal and two terminal spines.
Cibarium with straight row of 12 teeth .... ***palestinensis*** (p. 23)

– Aedeagus tapering to pointed tip, all spines on style terminal 24

24 Cibarium with small process in front of teeth, mesanepimeron with setal sockets; aedeagus short and gently tapering.......... ***squamipleuris*** (p. 25)

– Cibarium without any processes, mesanepimeron without setal sockets, aedeagus otherwise.... 25

25 Cibarium with convex row of uneven-sized, curved horizontal teeth (Fig. 75)....... ***tiberiadis*** (p. 26)

– Cibarium with straight horizontal teeth.......... 26

26 Cibarium with 3–4 horizontal teeth (Fig. 51), large cornua.......... ***christophersi*** (p. 19)

– Cibarium with 16–26 fine horizontal teeth, cornua small (not wider than long).......... 27

27 Cibarium with a single row of vertical teeth, horizontal teeth usually small and in groups ***clydei*** (p. 20)

– Cibarium with two or three rows of vertical teeth, horizontal teeth usually well developed ***adleri*** (p. 17)

28 Spermatheca clearly segmented (Fig. 52), ducts long and narrow. Abdominal tergites 2–6 with large setal sockets (erect hair sockets) 29

– Spermathecae not segmented but sometimes indistinctly striated, ducts not long and narrow. Abdominal tergites 2–6 without large setal sockets (recumbent hair sockets) 32

29 Cibarium with 4–5 long slender widely spaced horizontal teeth (Fig. 49) (numerous spicules may also be present).......... ***christophersi*** (p. 19)

– Cibarium with 12–14 closely packed horizontal teeth.......... 30

30 Cibarium with strong, curved horizontal teeth, those at sides longer than central teeth (Fig. 78) ***tiberiadis*** (p. 26)

– Cibarium with straight, closely packed horizontal teeth 31

31 Cibarium with 40–80 vertical teeth in 3–5 rows, more than 20 horizontal teeth (Fig. 48) ***adleri*** (p. 17)

– Cibarium with 12–30 vertical teeth in one or two rows, 12–13 horizontal teeth .... ***clydei*** (p. 20)

32 Spermatheca with capsule covered in numerous small spicules, cibarial teeth in convex row (Fig. 69).......... ***squamipleuris*** (p. 25)

– Spermatheca smooth, without spicules, cibarial teeth in straight or concave row 33

33 Spermatheca with capsule (Fig. 62). Well-developed cibarial teeth in straight row (Fig. 61) ***palestinensis*** (p. 23)
– Spermatheca simple, tubular. Cibarial teeth not straight and palisade-like 34
34 Cibarium with 50–60 equal-sized, horizontal teeth in a comb-like row .... ***minuta*** (p. 21)
– Horizontal cibarial teeth either unequal or row concave.. 35
35 Cibarium with central horizontal teeth at least half size of lateral horizontal teeth 36
– Cibarium with all horizontal teeth subequal, or lateral teeth only slightly larger than medial teeth 37
36 Cibarium with lateral horizontal teeth scale-like, very much larger than medial horizontal teeth ***taizi*** (p. 25)
– Cibarium with lateral horizontal teeth same shape as medial horizontal teeth .... ***theodori*** (p. 25)
37 Pharynx narrowing posteriorly with transverse striations or vague scale-like patterns ***schwetzi*** (p. 23)
– Pharynx widening posteriorly with distinct teeth 38
38 Pharynx without distinct shoulder (Fig. 54), sides almost straight, hind margin straight without notch. Cibarium with 16–18 horizontal teeth (Fig. 55) .... ***cincta*** (p. 20)
– Pharynx with distinct shoulder to give cordiform or funnel shape, hind margin with medial notch or depression. Cibarium with 16–26 horizontal teeth 39
39 Pharynx cordiform, hind pharyngeal teeth punctate, much smaller than anterior teeth (Fig. 59). Cibarium with 16–22 horizontal teeth, pigment patch usually rounded anteriorly (Fig. 60) .... ***fallax*** (p. 21)
– Pharynx not cordiform, without notch in anterior margin. Pharyngeal teeth large, little difference in size between posterior and anterior teeth (Fig. 56). Cibarium with more than 22 horizontal teeth, pigment patch usually angular anteriorly .... ***antennata*** (p. 19)

Review of species

Specimens were examined from many countries but, for brevity, only those from Egypt are listed. All type-specimens in the BMNH were examined.

Phlebotomus arabicus Theodor

(Figs 1–6)

Phlebotomus (Adlerius) chinensis arabicus Theodor, 1953: 120 [♂♀]. Lectotype ♂, YEMEN (BMNH), designated by Lewis & Buttiker (1982: 362).
Phlebotomus (Adlerius) arabicus Theodor; Artemiev, 1980: 1190. [Raised to species.]
Phlebotomus (Adlerius) davidi Artemiev, 1980: 1191 [♂♀]. Holotype ♂, YEMEN (MI). [Synonymised by Lewis & Büttiker, 1982: 362.]

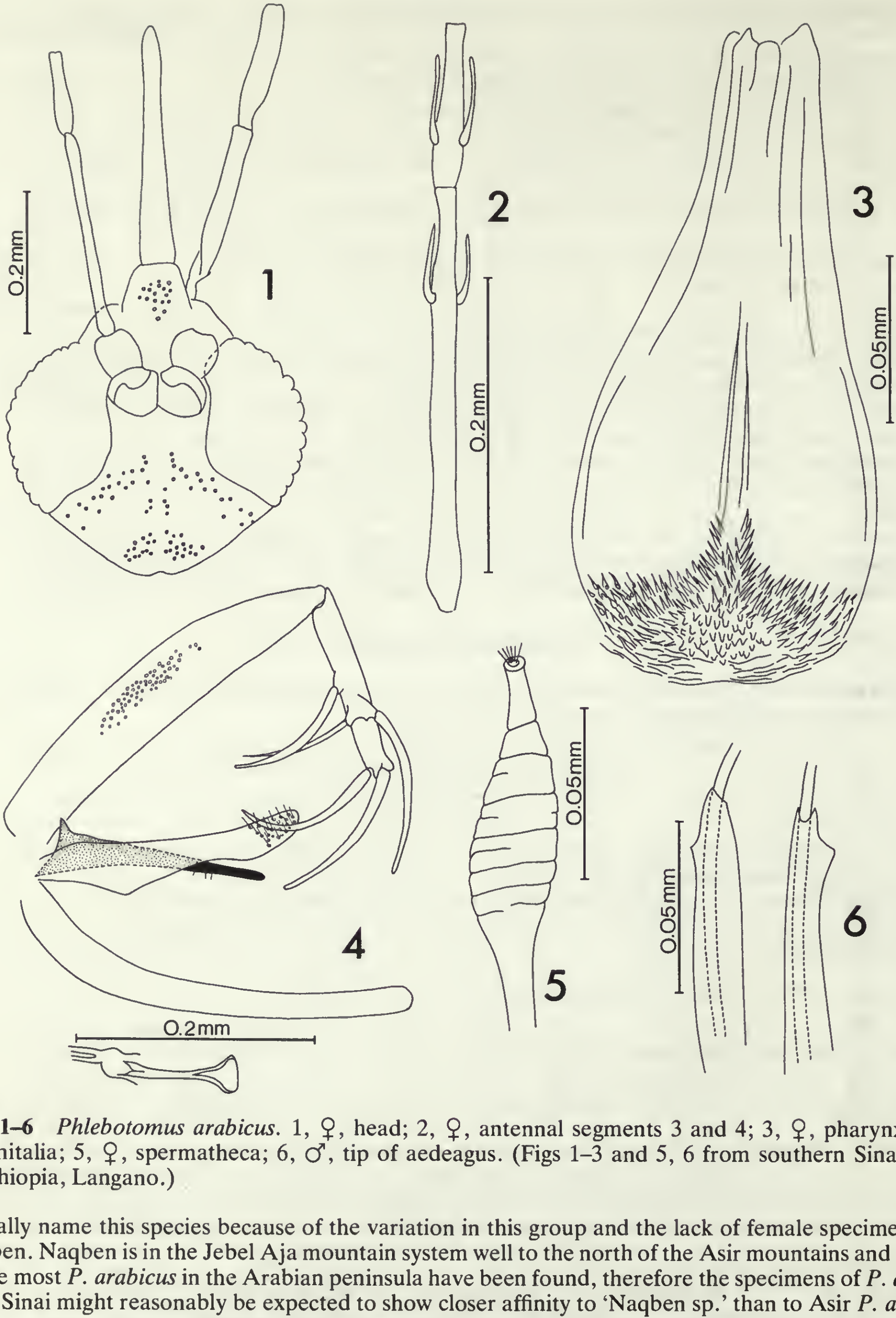
This species is currently placed in the subgenus *Adlerius* Nitzulescu.

FEMALE. Pharynx narrowing after posterior bulge, rounded posteriorly; armature a series of long backward-pointing teeth. A3 slender, as long as labrum, longer than A3+4. Ascoids short, slender, on A4 half length of segment. Palp segments slender, segments 2 and 3 approximately same length. Spermatheca delicate, elongated, ovoid and incompletely striated (Fig. 5) with small terminal knob and thick individual duct.
MALE. Wing length 2·29 mm (2·18–2·49 mm; n = 5). Pharynx slender; armature numerous small backward-pointing triangular teeth. Genitalia slender (Fig. 4). Aedeagus with pointed keel (Fig. 6). Style with two terminal spines, two on protuberance at 0·55 length style and one at 0·45 length style. Coxites with 58·4 (54–63, n = 4) hairs. Surstyles longer than coxites. Sperm ducts nines times length of pump.

MATERIAL EXAMINED
Egypt. Sinai: 3 ♂, 3 ♀, Mt Katherina, 15–16.vi.1979 (*Y.B.*); 3 ♂, 2 ♀, Tharfet el Qidren, 13–14.vi.1979 (*Y.B.*); 1 ♀, Upper Wadi Nasb, 14–15.vi.1979 (*Y.B.*); 1 ♀, Feiran, 12–13.vi.1979 (*Y.B.*).

DISTRIBUTION. Egypt, Ethiopia, Yemen, Saudi Arabia. This species has not previously been recorded from Egypt.

Lewis & Büttiker (1982) discussed the variation in this species and distinguished another taxon, *P.* 'Naqben sp.', from Naqben in northern Saudi Arabia, on four main features: darker thorax, larger size, higher number of coxite hairs (significantly different at P<0·001) and relatively longer sperm ducts. They did not



Figs 1–6 *Phlebotomus arabicus*. 1, ♀, head; 2, ♀, antennal segments 3 and 4; 3, ♀, pharynx; 4, ♂, genitalia; 5, ♀, spermatheca; 6, ♂, tip of aedeagus. (Figs 1–3 and 5, 6 from southern Sinai; Fig. 4 Ethiopia, Langano.)

formally name this species because of the variation in this group and the lack of female specimens from Naqben. Naqben is in the Jebel Aja mountain system well to the north of the Asir mountains and Yemen, where most *P. arabicus* in the Arabian peninsula have been found, therefore the specimens of *P. arabicus* from Sinai might reasonably be expected to show closer affinity to 'Naqben sp.' than to Asir *P. arabicus*. Table 1 compares three of the four features which distinguish 'Naqben sp.' and *P. arabicus*. Pigmentation was not included because the Sinai specimens were collected into, and stored in, alcohol which tends to make them darker. In the features measured, the Sinai *arabicus* clearly show a greater similarity to typical *P. arabicus* (as well as the lectotype) than to 'Naqben sp.', suggesting that the latter is a distinct taxon and not simply a geographic variant of *P. arabicus*. Table 1 also demonstrates that 'Naqben sq.' is distinct from *P. arabicus* only in the number of coxite hairs and not in overall size and relative length of the sperm ducts.

Table 1 Comparison of *P. arabicus* and *P.* 'Naqben sp.'

	arabicus lectotype	*arabicus* S. Arabia Lewis & Büttiker (1982)	Sinai	'Naqben sp.'
wing length	2.43 mm	2.34 mm	2.29 mm	2.47 mm
		(2·21–2·47)	(2·18–2·49)	(2·31–2·67)
sperm ducts: pump	9·75	7·6	9	9·9
number of coxite hairs	57	51·5	58·4	76·2
		(41–59)	54–63)	(54–98)

P. arabicus is a high-altitude species which Buttiker & Lewis (1984) found in association with *P. orientalis* and *S. taizi* in areas with cool or even cold winters.

The vectorial status of *P. arabicus* is unknown but, as several species of the subgenus *Adlerius* are vectors of visceral leishmaniasis in Asia, including the southern U.S.S.R. (*P. halepensis*; Sergiev, 1979: 208), Afghanistan (*P. longiductus*; Artemiev, 1978: 20) and the eastern Mediterranean (*P. simici*; Theodor, 1964: 480), *P. arabicus* should be investigated in any visceral leishmaniasis studies.

Phlebotomus alexandri Sinton

(Figs 7–14)

Phlebotomus sergenti var.; Newstead, 1920: 309 [♂].
Phlebotomus sergenti var. *alexandri* Sinton 1928*a*: 308 [♂]; Adler, Theodor & Lourie, 1930: 533 [♀]. Lectotype ♂, Iraq (BMNH), designated by Lewis (1982: 143).
Phlebotomus alexandri Sinton; Perfil'ev, 1966: 72–74. [Raised to species.]

This species is currently placed in the subgenus *Paraphlebotomus* Theodor.

Female. Head round (Fig. 9). Pharynx triangular with sides and posterior margin almost straight (Fig. 7); armature with large scale-like plates, each fringed anteriorly with long fine teeth. A3 much shorter than labrum (Fig. 9). Ascoids on A3 short and stout (Fig. 8). Spermatheca with 6–7 segments.
Male. Pharynx narrow, not tapering after posterior bulge, posterior margin straight; armature a series of irregular transverse striations. A3 stout, very much shorter than labrum, A3+4 only slightly longer than labrum. Genitalia overall very short and thick; coxite lobe short and broad (Figs 11, 12). Sperm pump with barrel as long as or only slightly longer than wide; plunger narrower than barrel (Figs 13, 14). Surstyles as long as coxite.

Material examined
Egypt. Sinai: Wadi Sa'al, 4 ♂, 2 ♀, 15–16.x.1979; 1 ♂, 9–10.vi.1979; 1 ♀, 14–15.vi.1979 (*Y.B.*); 1 ♀, Feiran, 12–13.vi.1979 (*Y.B.*).

Distribution. North Africa (including Egypt), Turkey, southern U.S.S.R., Israel, Ethiopia, Yemen, Saudi Arabia, Iraq, Iran, Kuwait, United Arab Emirates, Afghanistan, Pakistan. This species has not previously been recorded from Egypt.

P. alexandri is usually considered a highland species but it also occurs in suitable lowland areas (e.g. Kuwait: Lane & Al Taqi, 1983). It has been found naturally-infected with unidentified promastigotes in Turkmenia, where it is thought to be an important vector of cutaneous leishmaniasis (Dedet, 1979: 72; Petrishcheva, 1971: 573), and in Iran (Javadian *et al.*, 1977). It is a suspected vector of cutaneous leishmaniasis in several countries and Xiong *et al.* (1963) suggested that it may be involved in the transmission of visceral leishmaniasis in China.

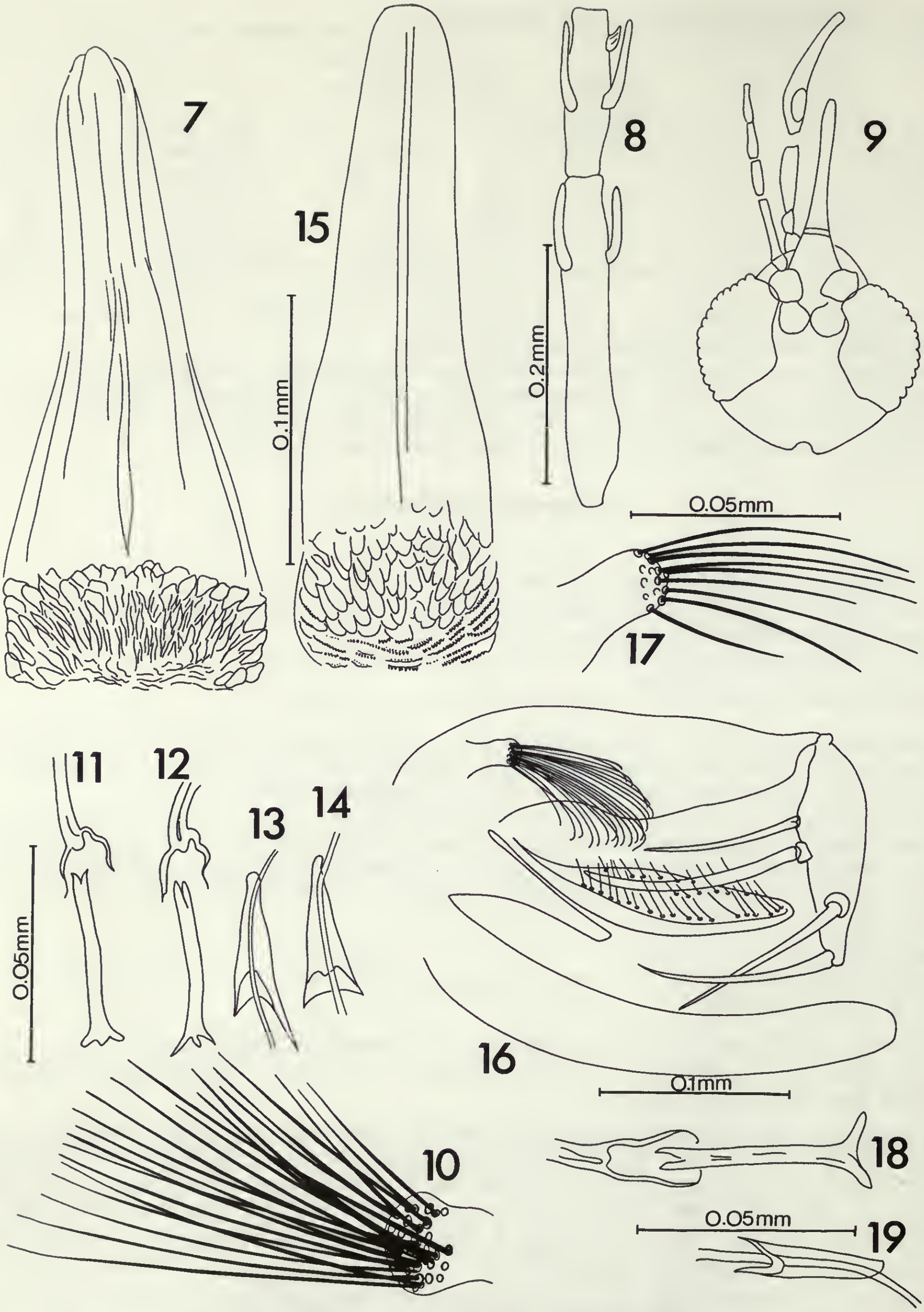
Phlebotomus kazeruni Theodor & Mesghali

(Figs 15–19)

Phlebotomus (Paraphlebotomus) kazeruni Theodor & Mesghali, 1964: 289, partim [♂ (♀ = *sergenti*)]. Holotype ♂, Iran (IPH).

This species is currently placed in the subgenus *Paraphlebotomus*.

Female. Pharynx slender with sides straight or slightly concave after posterior bulge (Fig. 15); hind margin



Figs 7–19 7–14, *Phlebotomus alexandri*. (7) ♀, pharynx; (8) ♀, antennal segments 3 and 4; (9) ♀, head; (10) ♂, basal process of coxite; (11, 12) ♂, sperm pump; (13, 14) ♂, aedeagus. (Figs 7–14 from Sinai, Wadi Sa'al.) 15–19, *P. kazeruni*. (15) ♀, pharynx; (16) ♂, genitalia; (17) ♂, basal process of coxite; (18) ♂, sperm pump; (19) ♂, aedeagus. (Fig. 15 from Saudi Arabia, Wadi Khumbra; Figs 16–19 Sinai, Mt Katherine.)

convex; armature extending to 0·25 pharynx length; a series of scales with those at anterior diagonal, becoming progressively transverse posteriorly; rows of minute teeth present on posterior scales; anterior margin of armature straight or slightly convex. A3 only slightly shorter than labrum, ascoid slender. Spermatheca a single capsule.

MALE. Pharynx narrowing after posterior bulge, convex posteriorly; armature a series of fringed scales. A3 longer than labrum. Parameres long and slender in lateral view, broad dorsally. Coxite lobe long and broad (Fig. 17). Style three and half times as long as wide. Barrel of sperm pump longer than wide, plunger at least as wide as barrel (Fig. 18). Surstyles longer than coxites.

MATERIAL EXAMINED

Egypt. Sinai: 2 ♂, St Katherina, 15–16.vi.1979 (*Y.B.*); 7 ♂, Tharfet el Qidren, 13–14.vi.1979 (*Y.B.*). Several females from various parts of southern Sinai may be this species or *P. sergenti*, but their spermathecae, the diagnostic character, are not visible.

DISTRIBUTION. Egypt, central Saudi Arabia, southern Iran, Afghanistan. This species has not previously been recorded from Egypt.

In Afghanistan, *kazeruni* occurs in low rocky deserts (Artemiev, 1978). In Saudi Arabia it is not peridomestic but is only found in remote wadis and hills, some very dry with sparse vegetation (Buttiker & Lewis, 1984). Lewis (1982) suggests that this species is sufficiently common in Saudi Arabia to transmit *Leishmania* among rodents.

Phlebotomus langeroni Nitzulescu

(Figs 20, 23–28)

Phlebotomus perniciosus var.; Nitzulescu, 1930*a*: 382 [♂].
Phlebotomus langeroni Nitzulescu, 1930*b*: 548 [♂]. Holotype ♂, TUNISIA (?FM).

This species is currently placed in the subgenus *Larroussius* Nitzulescu.

FEMALE. Pharynx not tapering after posterior bulge, posterior margin straight or slightly convex, armature extending 0·27 (0·24–0·29) length of pharynx and consisting of series of tightly packed irregular rows of minute denticles and lateral scales without teeth. A3 slightly shorter than labrum (0·90). Ascoids on A4 more than 0·50 length of segment (Fig. 20). Spermatheca with 10–11 segments, neck long, over half length of spermathecal body, individual ducts with transverse striations (Fig. 26).

MALE. Pharynx slender, parallel-sided after posterior bulge, armature a series of transverse ridges of minute teeth. Antennal segments 3–12 with two ascoids. Aedeagus slender with ventral subapical opening (Fig. 25). Parameres finger-like. Surstyles longer than coxites. Coxites slender, 5·42 (5·25–5·58) times longer than wide (Fig. 24).

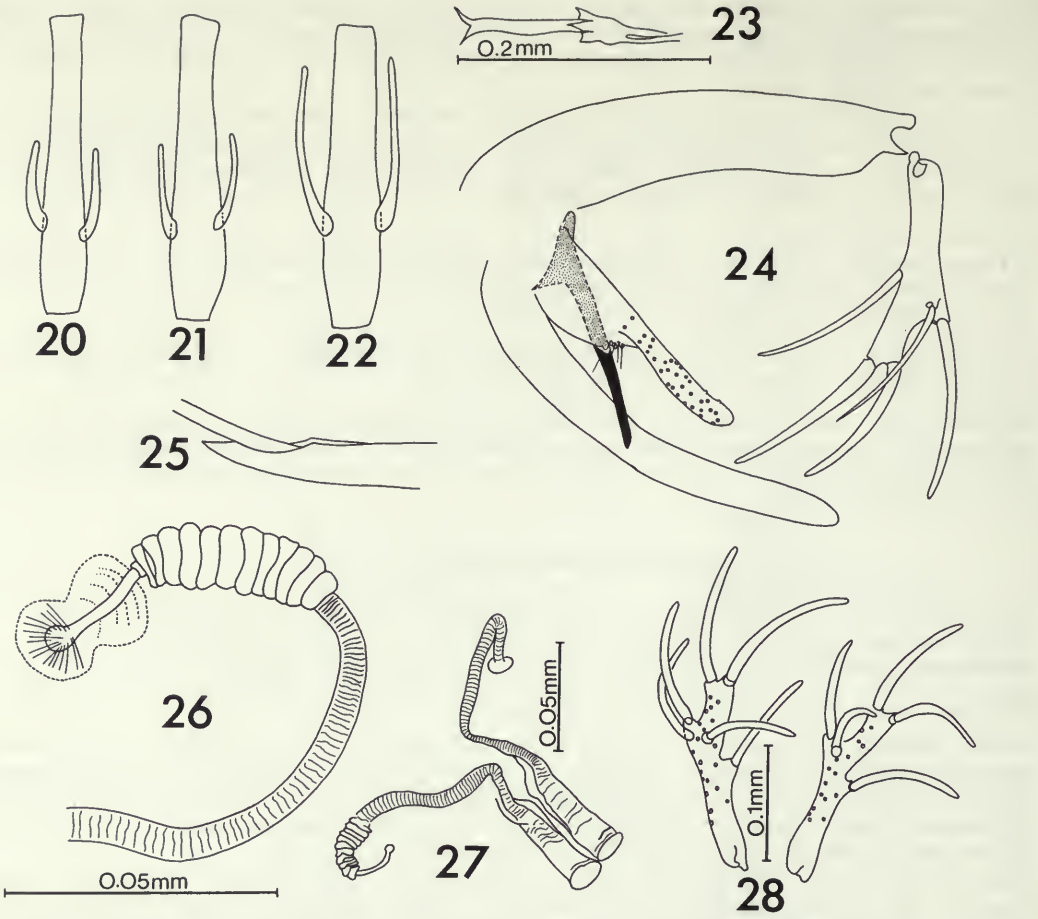
The female of this species has recently been described (Sawaf, Kassem & Said, in press) (see under *P. orientalis* for comments on identification). Some aberrant male specimens with six spines on the style instead of five were reared in culture (Fig. 28).

MATERIAL EXAMINED

Egypt. 2 ♀, Al Agamy, 15.viii.1983; 1 ♀, in poultry house, 11.x.1983 (*R.P.L.*) [used to establish colony]; 1 ♂, rodent burrow, 1 ♂, sticky trap near house, 5.x.1982.

DISTRIBUTION. Morocco, Tunisia, Libya, Egypt. Sawaf *et al.* (1984) record this species from Al Agamy, near Alexandria (Egypt), based on the identification of two males listed below (det. R.P.L.).

Until recently, *P. langeroni* was considered a very rare species known only from Morocco (Ristorcelli, 1945), Tunisia (Croset *et al.*, 1978) and Libya (Nitzulescu & Nitzulescu, 1933). In their survey of Tunisia, Croset *et al.* (1978) found this species in coastal areas only, where it was rare – in one sample of over 9600 sandflies from Fondouk-Choucha (near Tunis) there was only a single specimen of *P. langeroni. P. langeroni* comprised only 0·1% of 5000 sandflies collected in various parts of Tunisia over a two-year period (Chadli *et al.*, 1970*b*). Chadli *et al.* (1970*a*) collected *P. langeroni* in the town of Tunis. In Egypt this species has only been found during an epidemiological survey at a focus of visceral leishmaniasis at Al Agamy, near Alexandria. Here, *P. langeroni* constituted only 1–2% of aspirator catches made inside houses, but up to 50% of catches made with sticky traps placed in animal houses and animal burrows near houses (J. Beier, pers. comm.). The only other *Phlebotomus* species found at this focus was *P. papatasi*. Sawaf *et al.* (1984) have suggested that *P. langeroni* is the vector of visceral leishmaniasis in Al Agamy, because *P. papatasi* is a very poor vector of *Le. donovani* and *P. langeroni* is closely related to other vectors of visceral leishmaniasis (*P. orientalis* and *P. perniciosus* Newstead).



Figs 20–28 20–22, ♂, antennal segment 4 of (20) *Phlebotomus langeroni*, Egypt, Al Agamy; (21) *P. orientalis*, Sudan, Paloich District; (22) *P. orientalis*, Yemen, Taiz. 23–28, *P. langeroni*. (23) sperm pump; (24) ♂, genitalia; (25) ♂, tip of aedeagus; (26) ♀, spermatheca; (27) ♀, spermathecal ducts; (28) ♂, complementary styles, one showing additional spine. (Figs 23–28 all ex laboratory culture originating in Al Agamy, near Alexandria.)

Phlebotomus major Annandale 'Sinai form'

(Figs 32–34)

Phlebotomus major Annandale, 1910: 46.
Phlebotomus (Larroussius) major Annandale; Perfil'ev, 1966: 254.

P. major is the type-species of the subgenus *Larroussius*.

Four female specimens from Tharfet el Qidren in the southern Sinai represent a distinct form of *P. major*. The pharynx, with ridges of fine teeth, is typical of the subgenus *Larroussius*. However, the pharyngeal armature extends to the mid point of the pharynx (Fig. 32) and therefore closely resembles that of *P. major neglectus* from Italy, Malta, Albania, Yugoslavia. It differs from *neglectus* in having A3 much shorter than the labrum. Another subspecies, *P. major syriacus*, is known from the eastern Mediterranean, and recently, from northern Saudi Arabia (Lewis & Buttiker, 1982). Table 2 summarises some biometric characters of the Sinai form as well as the syntypic series of *syriacus* in the BMNH from Jerusalem and Syria. The two forms differ in the ratio length of the pharyngeal armature/length of pharynx:- 0·25 in *syriacus* and 0·5 in 'Sinai form', and the A3/labrum ratio: 0·96 in *syriacus* and 0·87 in 'Sinai form'.

The only other Middle East species with an extensive pharyngeal armature in the subgenus *Larroussius*

Table 2 Comparison of some biometric characters of *P. major* from Sinai and syntypes of *P. major syriacus* from Jerusalem and Syria.

	length of A3	A3/labrum	Pharyngeal armature: proportion of pharynx	length of pharynx
P. major 'Sinai form'	0·299 mm n = 3	0·878 n = 3	0·491 n = 3	0·223 mm n = 3
P. syriacus syntypes	0·366 mm n = 8 sd = 0·028	0·966 n = 8 sd. = 0·036	0·258 n = 11 sd. = 0·038	0·215 mm n = 11 sd = 0·014

is *P. wenyoni*, which is restricted to certain areas of Iran. *P. major* 'Sinai form' can be differentiated by the shape of the pharynx and the detailed morphology of the armature. In *P. wenyoni* the teeth are all on small elliptical scales with serrated edges whereas in 'Sinai form' the teeth are more isolated and in smaller groups. This difference is especially clear in the anterior part of the pharyngeal armature.

Unfortunately, no males of *P. major* were collected in Egypt. The record of *P. major syriacus* from Saudi Arabia was based on two males and therefore the material is not directly comparable with the Sinai specimens.

P. major was divided into three subspecies by Theodor (1958), and Perfil'ev (1966) added another (*P. major krimensis*). However, the distribution of some subspecies (given in Lewis, 1982) overlaps to a considerable degree and these populations cannot therefore be considered true subspecies (see Lane & Marshall, 1981, for discussion of subspecies). Until they are taxonomically revised, probably as a species-group composed of several species, it is not prudent to name formally the distinctive southern Sinai form, particularly as only females are available.

The closely related *P. major syriacus* has been infected with *Le. donovani* (see Adler & Theodor, 1957) and is considered to be a vector of visceral leishmaniasis in the eastern Mediterranean area (Hoogstraal & Heyneman, 1969: 1185; Theodor, 1964: 480; Léger *et al.*, 1979: 20).

The occurrence of *P. major* 'Sinai form' in the mountains of the southern Sinai is consistent with the habitat-characteristic of this species-group. For example, *P. major syriacus* is only abundant at altitudes above 300 m in Greece (Léger *et al.*, 1979).

P. major has not previously been recorded from Egypt.

MATERIAL EXAMINED

Egypt. Sinai: 4 ♀, Tharfet el Qidren, 13–14.vi.1979 (*Y.B.*).

Phlebotomus orientalis Parrot

(Figs 21, 22, 29–31)

Phlebotomus (Phlebotomus) langeroni var. *orientalis* Parrot, 1936: 30 [♂♀]. Syntypes 32 ♂, 24 ♀, ETHIOPIA (IPA).

Phlebotomus orientalis Parrot; Parrot & Clastrier, 1946: 64. [Raised to species.]

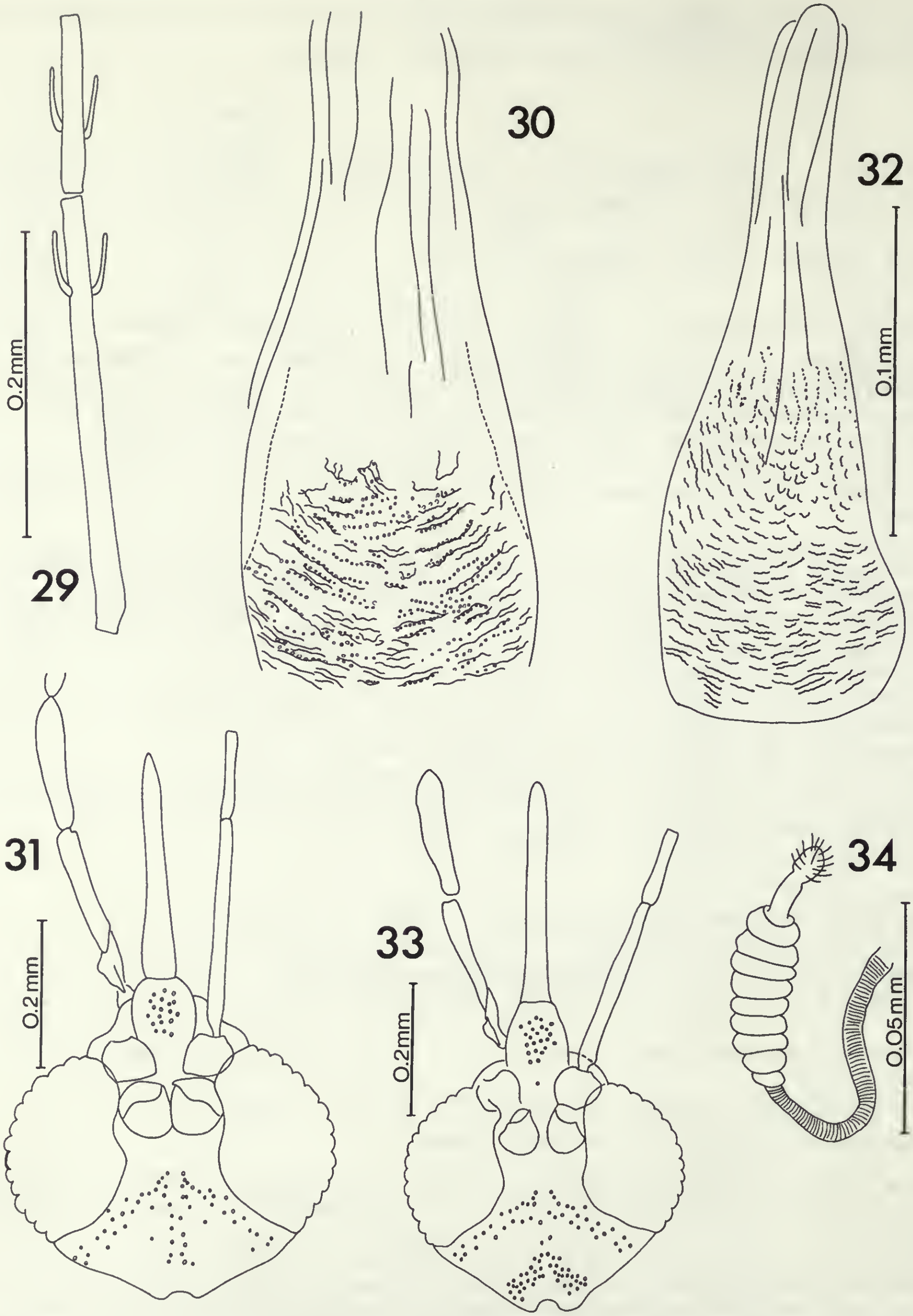
This species is currently placed in the subgenus *Larroussius*.

FEMALE. Pharyngeal armature consisting of irregular rows of nine pin-like teeth (often only the tooth bases can be seen as dark spots), pharynx with indistinct posterior margin (Fig. 30). Ascoids on A3 and A4 short (Fig. 29). A3 almost as long as labrum (Fig. 31).

MALE. Pharynx narrowing slightly after posterior bulge, armature a series of short transverse ridges of minute denticles extending 0·20–0·26 length of pharynx. Antennal segments 8–12 with a single ascoid. Aedeagus long, slender, with lateral subapical opening. Coxite slender, 5·1 times as long as wide.

Parrot & Clastrier (1946) elevated *P. langeroni orientalis* to species rank, although it continued to be treated as a subspecies of *P. langeroni* by some authors until quite recently, e.g. Lewis *et al.* (1974) and Theodor (1958). The males of *P. orientalis* and *P. langeroni* may be distinguished by the distribution of the ascoids on antennal segments 8–12 (1 per segment in *P. orientalis*, 2 in *P. langeroni*) and by subtle differences in the position of the subapical opening of the aedeagus, which is ventral in *P. langeroni* and lateral in *P. orientalis*. This aedeagal character can only be observed in perfectly mounted specimens. The females can be distinguished by the relative lengths of the ascoids on A4 (Figs 21, 22).

The male of *P. orientalis* can be distinguished from that of *P. major* by the parameres which are broad in



Figs 29–34 29–31, *Phlebotomus orientalis.* (29) ♀, antennal segments 3 and 4; (30) ♀, pharynx; (31) ♀, head. (Figs 29–31 Sinai, Tharfet el Qidren.) 32–34, *P. major.* (32) ♀, pharynx; (33) ♀, head; (34) ♀, spermatheca. (Figs 32–34 S. Sinai.)

P. orientalis but slender in *P. major*, and by the aedeagal tip which is pointed in *P. orientalis*, but blunt and rounded in *P. major*.

MATERIAL EXAMINED

Egypt. Sinai: 32 ♂, 2 ♀, Upper Wadi Nasb, 14–15.vi.1979 (*Y.B.*); 10 ♂, 9 ♀, Tharfet el Qidren, 13–14.vi.1979 (*Y.B.*).

DISTRIBUTION. Chad, Niger, Ethiopia, Kenya, Sudan, Egypt, Yemen, Saudi Arabia (SW.). This is the first record of *P. orientalis* from Egypt.

The record from the southern Sinai is the furthest north *P. orientalis* has been found. This species shows a classical East African–Arabian highland distribution, with the important exception of the lowland records from Sudan (Kirk & Lewis, 1940; Quate, 1964). In western Saudi Arabia, Buttiker & Lewis (1984) found that *P. orientalis* was predominant at altitudes above 1750 m and was absent in the lowlands.

P. orientalis is a pernicious man-biter in many parts of its range with biting rates of 108–208 per hour in Ethiopia (Ashford, 1974). It is a vector of *Le. donovani donovani* in the *Acacia-Balanites* forests of southern Sudan (Hoogstraal & Heyneman, 1969). Ashford (1974) concluded that *P. orientalis* did not transmit visceral leishmaniasis regularly in the highlands of Ethiopia (around Arbaya), although imported infections might be transmitted occasionally.

Phlebotomus papatasi (Scopoli)

(Figs 35–39)

Bibio papatasi Scopoli, 1786: 55 [♀] Type(s), ITALY (U, Pavia?).
Phlebotomus (Phlebotomus) papatasi (Scopoli) [see Lewis (1982) for complex nomenclatural history].

This species is the type-species of *Phlebotomus*.

FEMALE. Pharynx stout, narrowing after posterior bulge; armature consisting of numerous small scales with fringe of fine backward-pointing teeth (Fig. 38). A3 shorter than labrum. Spermatheca with segments (Fig. 37).

MALE. Pharynx slender, with numerous small teeth. Paramere with three lobes, dorsal lobe very much longer than broad median lobe. Coxite with small tuft of hairs on plate basally, and another clump of long hairs distally. Style long, slender, with short pointed spines: three terminal, distance between median and subapical spine less than between subapical and terminal spine (Fig. 39).

MATERIAL EXAMINED

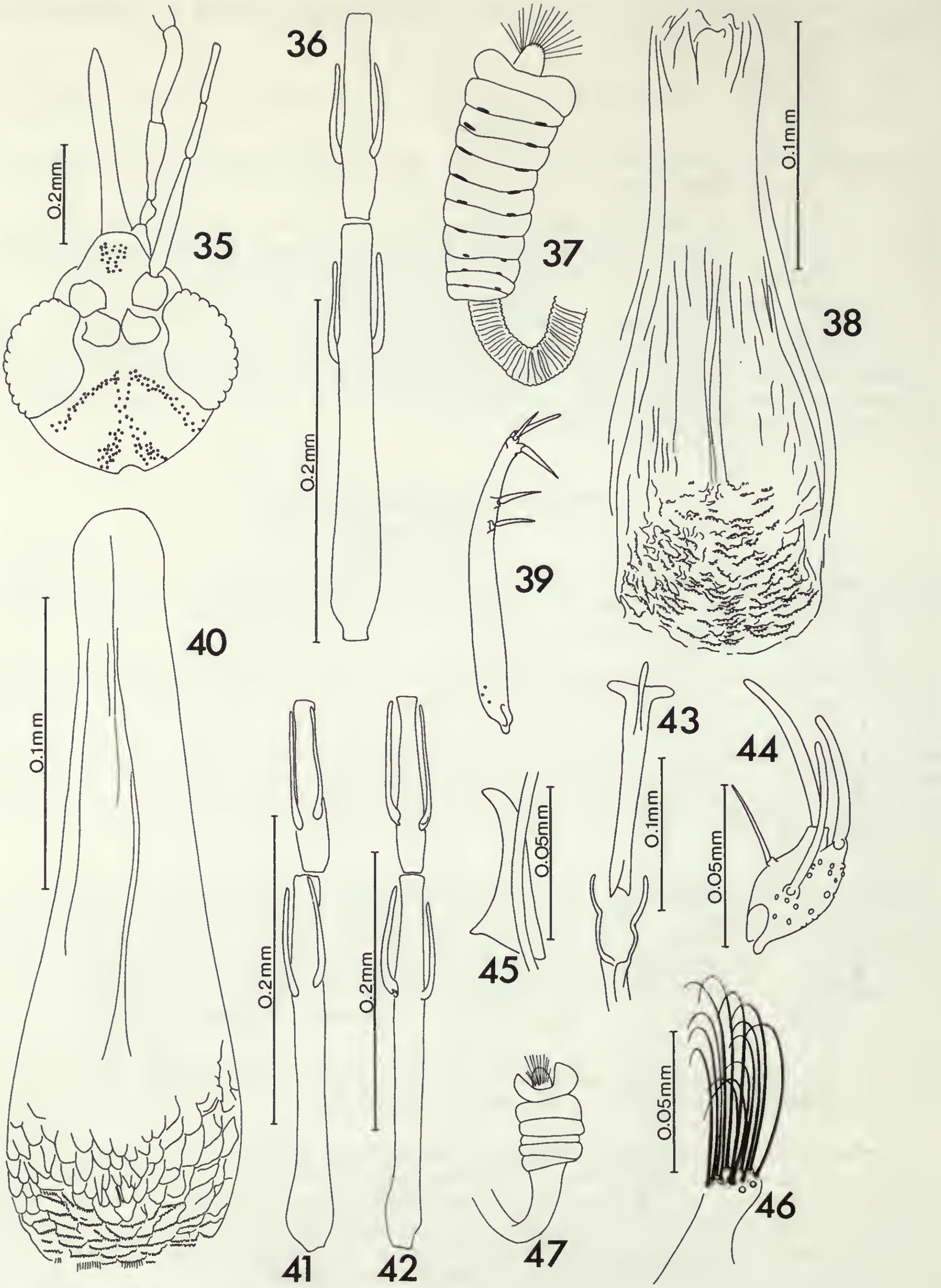
Egypt. As numerous specimens of this common species were examined only localities and collectors are given. Alexandria (*M.A.R.*); Alexandria, El Amriya (*Z.A.H.*); Bahteem (*M.A.R.*); Beni Suef (*M.A.R.*); Birqet Qarun (*R. L. Coe*); Cairo, El Amirga, caves (*M. L. Schmidt*); Cairo, El Amiriya, Apartment buildings (*M. L. Schmidt*); Cairo, Mena House (*J. Wakeling*); Dakhaliya (*M.A.R.*); Fayoum (*R. L. Coe*); Imbaba (*M.A.R.*); Khasm (*H. King*); Luxor (*S. Hirst*); Matruh (*M.A.R.*); Quahsbieh (*Z.A.H.*); Sinai, Abu Aweigila (*Y. Schlein*); 30 50′N, 34 20′E, military bunkers (*J. Zimmerman*); Siwa (*Omer-Cooper*); Tanta (*M.A.R.*).

DISTRIBUTION. This is the most widespread of any sandfly species, and is distributed from Portugal and Morocco in the west to Bangladesh in the east and from southern U.S.S.R. in the north to Sudan in the south.

This species has been reported from Egypt by the following: Willcocks (1917); Whittingham & Rook (1923: suggested vector of phlebotomus (= papataci) fever); Khalil (1934: suggested vector of cutaneous leishmaniasisi); Sabin, Philip & Paul (1944: vector of phlebotomus fever virus); Schmidt *et al.* (1960, 1971: isolation of phlebotomus fever virus from Cairo *P. papatasi*); Zein el Dine (1972: found in Dakhla Oasis but not Baharia or Kharga oases); Hafez (1977); Rifaat *et al.* (1968: no localities given); Hassan (1968*a*: extensive survey, found throughout country except non-peridomestic areas in Sinai and around Aswan); Kammah (1972: autogeny); Sawaf *et al.* (1984: Al Agamy, nr Alexandria).

During rapid field examination of samples, female *P. papatasi* may be confused with *Sergentomyia christophersi* because of the similarity in the shape and segmentation of the spermathecal capsule, and the presence of a large number of erect hair sockets on the abdominal tergites. *S. christophersi* can easily be distinguished, however, by the presence of cibarial teeth.

Schmidt & Schmidt (1963) give a detailed account of the morphological variation in a single population from a suburb of Cairo and conclude that the Egyptian *P. papatasi* bear a 'marked resemblance to



Figs 35–47 35–39, *Phlebotomus papatasi*. (35) ♀, head; (36) ♀, antennal segments 3 and 4; (37) ♀, spermatheca; (38) ♀, pharynx; (39) ♂, style. (Figs 35–39 Sinai 30° 50′N 34° 20′E.) 40–47, *P. sergenti*. (40) ♀, pharynx; (41, 42) ♀, antennal segments 3 and 4; (43) ♂, sperm pump; (44) ♂, style; (45) ♂, aedeagus; (46) ♂, basal process of coxite; (47) ♀, spermatheca. (Fig. 40 Libya, Jarian Prov.; 41 Libya, Yefran; 42 Cairo, Maadi, 43–46 Jordan, Mowaggar; 47 Egypt, Sharkeyia.)

specimens from other areas [but] several differences are apparent in the Egyptian material [which] constitute preliminary evidence for infra specific variation'.

This is probably the most studied of all sandflies because of its abundance, widespread distribution, anthropophily and peridomestic habits. It is the main vector of cutaneous leishmaniasis to man (Abonnenc, 1972: 100; Lewis, 1974*a*; Theodor, 1964; Williams & Coelho, 1978) in many parts of its range. In the Mediterranean basin and the Middle East *P. papatasi* has been proved a vector in several countries, e.g. Israel (Schlein *et al.*, 1982; Adler & Ber, 1941), and strong circumstantial evidence exists for its vectorial status in many other countries, e.g. Saudi Arabia (Nadim, Rashti & Ashi, 1979); Afghanistan (Nadim *et al.*, 1979); Iran (Adler, 1964) and North Africa (review: Dedet, 1979). It is undoubtedly the vector of cutaneous leishmaniasis in Egypt, but other species may also be involved (e.g. *P. sergenti*). *P. papatasi* has been suspected of transmitting visceral leishmaniasis in areas where no other likely vector has been found: Saudi Arabia (Lewis & Buttiker, 1980); Iraq (Abu-Hab & Azawia, 1978; Adler & Theodor, 1957; Sukkar, 1972). However, it is not an efficient vector of *Le. donovani* experimentally but might transmit it rarely (Hoogstraal & Heyneman, 1969; Zahar, 1980: 45, 53). The feeding habits of *P. papatasi* in Lower Egypt are given by Schmidt & Schmidt (1965).

Phlebotomus fever virus was isolated from wild caught *P. papatasi* collected from human dwellings in suburban Cairo (Schmidt *et al.*, 1960). This, together with the earlier work of Sabin *et al.* (1944), which clearly demonstrated that *P. papatasi* was capable of transmission after the necessary incubation, incriminated *P. papatasi* as the vector of phlebotomus fever virus in Lower Egypt.

Phlebotomus sergenti Parrot

(Figs 40–47)

Phlebotomus sergenti Parrot, 1917: 564 [♂]; Franca, 1918: 731 [♀]. Syntypes ♂, ALGERIA (IPA).

This species is currently placed in the subgenus *Paraphlebotomus* Theodor.

FEMALE. Pharynx with large scales anteriorly, some produced into long broad spines, scales becoming broader and flatter posteriorly with hind margin serrated with fine teeth (Fig. 40). Third and fourth antennal segments with slender ascoids almost reaching tip of segment (Figs 41, 42). Spermatheca with equal segments (Fig. 47).

MALE. Pharynx tapering after posterior bulge, posterior margin convex; armature series of scales with minute teeth along anterior margins. A3 slender, longer than labrum. Coxite short and stout, less than twice as long as wide. Coxite lobe slender and relatively long (Fig. 46). Surstyles longer than coxite.

MATERIAL EXAMINED

Egypt. 1 ♀, Cairo, Maadi, 7.vii.1943 (*Theodor*); 1 ♀, Sharkeyia, 1967 (*M.A.R.*); Sinai: 1 ♂, Upper Wadi Nasb, 14–15.vi.1979 (*Y.B.*); 1 ♂, Wadi Baaba, 8–9.vi.1979 (*Y.B.*).

DISTRIBUTION. Mediterranean Basin eastwards through Israel, Iraq, Iran, Afghanistan, Pakistan, India and southwards to Saudi Arabia, Yemen and Ethiopian highlands.

Theodor (1948) found *P. sergenti* around Cairo and Rifaat *et al.* (1968) record it but give no localities.

P. sergenti is a proven vector of cutaneous leishmaniasis in the U.S.S.R. (Sergiev, 1979: 206), Crete (Molyneux, 1977), Iraq and India (Abonnenc, 1972). It is a suspected vector of *Le. tropica* in many countries including Iran (Nadim & Rashti, 1971) and Yugoslavia (Lupascu *et al.*, 1977). Schlein *et al.* (1984) found promastigotes in *P. sergenti* from the Arava in Israel.

Sergentomyia adleri (Theodor)

(Fig. 48)

Phlebotomus adleri Theodor, 1933: 543 [♂♀]. Syntypes, GHANA (BMNH).

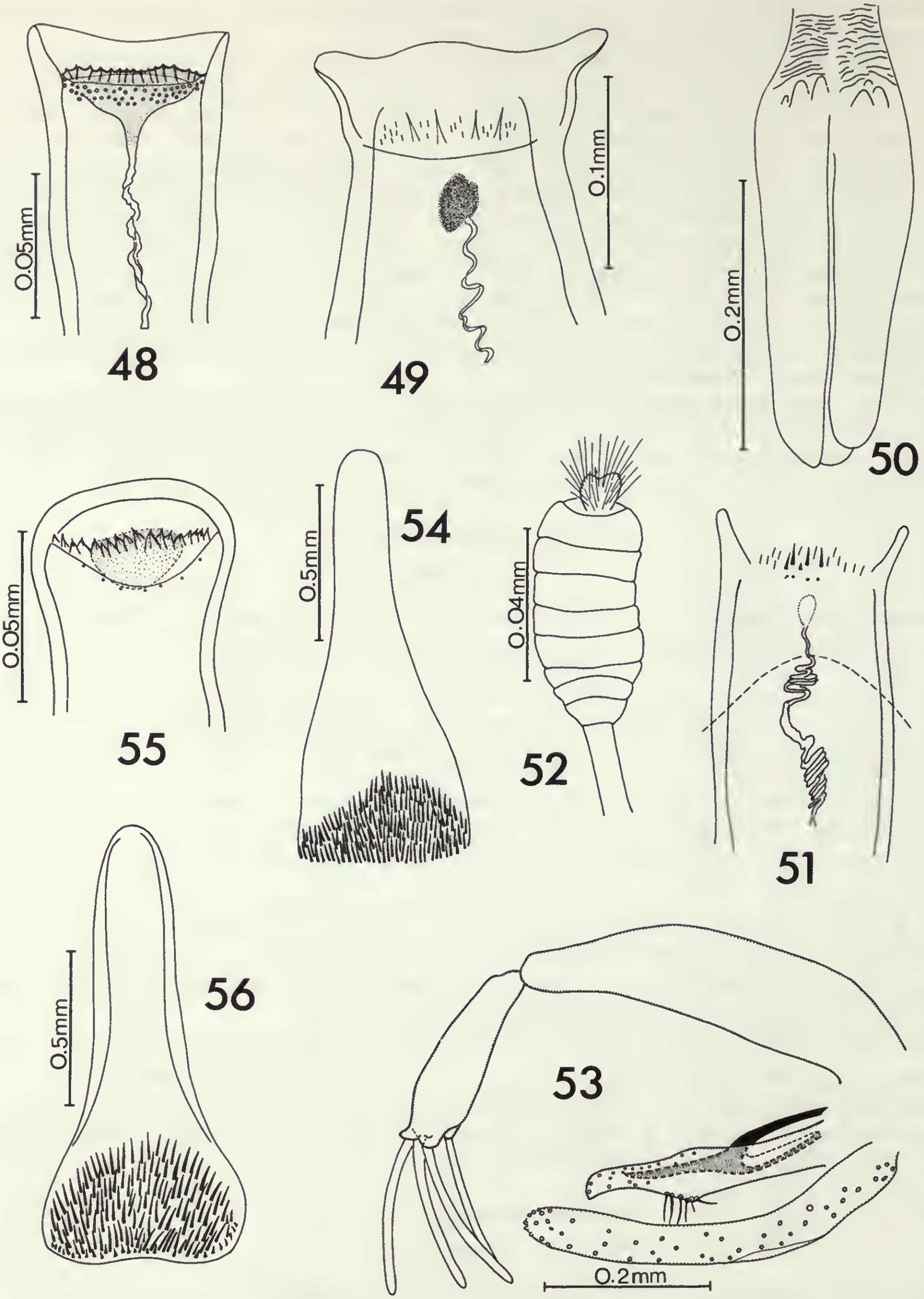
This species is currently placed in the subgenus *Sintonius* Nitzulescu.

FEMALE. Cibarium with 54 vertical teeth in three rows and 17 subequal irregularly spaced horizontal teeth; pigment patch almost as wide as cibarial armature with pronounced anterior projection. Pharynx slender, tapering slightly after posterior bulge, armature only a series of vague transverse striations.

MALE. Very similar to *S. clydei* except that cibarium has two or three rows of vertical teeth, usually 6 in each row, and horizontal teeth evenly spaced (not in groups like *S. clydei*).

MATERIAL STUDIED

Egypt. Sinai: 1 ♀, Feiran 12–13.vi.1979 (*Y.B.*).



Figs 48–56 48, *Sergentomyia adleri* ♀, cibarium, Sinai, Feiran. 49–53, *S. christophersi*. (49) ♀, cibarium; (50) ♂, pharynx; (51) ♂, cibarium; (52) ♀, spermatheca; (53) ♂, genitalia. (Figs 49–53 Aswan.) 54, 55, *S. cincta*. (54) ♀, pharynx; (55) ♀, cibarium. (Figs 54, 55 Siwa Oasis.) 56, *S. antennata* ♀, pharynx, Sinai 30° 50′N 34° 20′E.

DISTRIBUTION. Senegal, Ivory Coast, Ghana, Cameroun, Nigeria, Togo, Upper Volta, Chad, Republic of Central Africa, Sudan, Egypt, Kenya, Saudi Arabia. This is the first record from Egypt.

This species is closely related to *S. clydei* and has been considered synonymous by many authors (see discussion under *S. clydei*).

Sergentomyia antennata (Newstead)

(Figs 56–57)

Phlebotomus antennatus Newstead, 1912: 365 [♀]. Holotype ♀, GHANA (BMNH).

This species is currently placed in the subgenus *Sergentomyia*.

FEMALE. Cibarium with concave row of delicate unequal-sized teeth; pigment patch almost triangular, with anterior projection acutely angled, posterior margin broad, indented. Pharynx stout with armature of distinct teeth less than 0·20 pharynx length; posterior margin with shallow notch (Fig. 56).

MALE. Cibarium with row of about 16 irregular teeth and small spicules; some vertical teeth also present. Pharynx slender with small triangular teeth. Style stout, less than three times as long as wide; two terminal, two subterminal spines (Fig. 57).

MATERIAL EXAMINED

Egypt. Sinai: 1 ♂, 2 ♀, 30 50′N 34 20′E, 19.vii.1983, light-trap in bunkers (*J. Zimmerman*).

DISTRIBUTION. Occurs in a broad band south of the Sahara desert from Ghana through Central African Republic, East Africa, Yemen, Saudi Arabia to Kuwait. It has also been recorded from Algeria and Tunisia. This is the first record of this species from Egypt.

This is a very variable taxon and opinions differ on whether it is one or many species. The shape of the pharynx on which most differentiation is made is very variable, e.g. see Lewis & Buttiker (1982: 368).

S. antennata is commonly found outside houses associated with *P. papatasi* (Buttiker & Lewis, 1983; Lane & Al Taqi, 1983). Schlein *et al.* (1984) found 'promastigotes, possibly of reptilian leishmanial species' in 7 out of 33 *antennata* caught together at Arava (Israel).

Sergentomyia christophersi (Sinton)

(Figs 49–53)

Phlebotomus christophersi Sinton, 1927: 33 [♀]. Lectotype ♀, PAKISTAN (BMNH), designated by Lewis & Büttiker (1982: 365).

This species is currently placed in the subgenus *Sintonius*.

FEMALE. Cibarium with four or five long teeth, many small denticles visible in some specimens; small pigment patch present (Fig. 49). Pharyngeal armature with a few scale-like folds anteriorly and a series of vague ridges posteriorly. Spermathecae smooth-walled with approximately eight segments and long individual ducts (Fig. 52).

MALE. Cibarium with several long teeth and some small denticles (Fig. 51). The distinction between the large teeth and denticles is less marked in males than females. Pharynx constricted after bulge; armature a series of indistinct ridges (Fig. 50). Two apical and two subapical spines on style. Paramere simple. Surstyle longer than parameres. Aedeagus slender, tapering from base (Fig. 53).

MATERIAL EXAMINED

Egypt. Aswan: 55 ♂, 60 ♀, Elephantine Island, 3–5.x.1983, sticky traps amongst rocks harbouring numerous geckoes (*R.P.L.*).

DISTRIBUTION. Guinea, Chad, Ethiopia, Sudan, Egypt, North Yemen, Saudi Arabia, Oman, Pakistan. This is the first record of *S. christophersi* from Egypt.

This species is closely related to *S. clydei*, from which it can be distinguished by the number of cibarial teeth.

	male	female
christophersi	3–5	4
clydei	16–26	12

Sergentomyia cincta (Parrot & Martin)

(Figs 54, 55)

Phlebotomus antennatus var. *cinctus* Parrot & Martin 1944: 55 [♂♀]. Syntypes, Djibouti, Sudan (IPA), 1 ♀ syntype (BMNH).
Sergentomyia cincta (Parrot & Martin) Theodor, 1958: 38.

This species is currently placed in the subgenus *Sergentomyia*.

Female. Cibarium with concave row of 16–18 teeth, lateral teeth slightly smaller than central teeth (Fig. 55); pigment patch a rounded triangle, hind margin convex. Pharynx without distinct shoulder, hind margin straight or slightly convex, posterior teeth only slightly smaller than anterior teeth.
Male. Indistinguishable from *S. antennata*.

Material examined
Egypt. 13 ♀, Siwa Oasis, 6.viii.1935 (*Omer-Cooper*), det. O. Theodor.

Distribution. Ghana, Central African Republic, Kenya, Uganda, Sudan, Ethiopia, Djibouti, Egypt. This is the first record of *cincta* from Egypt.

This species is considered to be conscpecific with *S. antennata* by some authors (e.g. Duckhouse & Lewis, 1980), but as a distinct but closely related taxon in the *S. fallax*-group by others (Abonnenc, 1972; Theodor, 1958; Davidson, pers. comm.).

Sergentomyia clydei (Sinton)

Phlebotomus clydei Sinton, 1928*b*: 179 [♂♀]. Lectotype ♂, Pakistan (BMNH), designated by Lewis (1967: 42).

This species is currently placed in the subgenus *Sintonius*.

Female. Cibarium with row of 13–16 triangular, slender teeth; 25–37 vertical teeth in one or two rows, some teeth may be present centrally so as to produce a short third row; pigment patch triangular, broad, as wide as cibarium. Pharynx tapering markedly after bulge, no armature apparent although a few fine transverse ridges present in some specimens. Spermatheca distinctly segmented (collapsed in all specimens, therefore segment number unavailable); individual ducts rugose.

Male. Cibarium with tufts of small denticles posteriorly; pigment patch triangular, not as broad as cibarium. Pharynx more slender than in female and constriction after bulge less obvious. Abdominal tergites 5 and 6 subequal in length. Paramere with beak-like apex, style with 2 apical and 2 subapical spines. Aedeagus slender, pointed.

Material examined
Egypt. Sinai: 1 ♂, 5 ♀, Tharfet el Qidren, 13–14.vi.1979 (*Y.B.*).

Distribution. Algeria, Egypt, Mali, Senegal, Ghana, Niger, Chad, Cameroun, Sudan, Ethiopia (including Eritrea), Somalia, Kenya, Iraq, U.S.S.R. (Kazakstan, Tajikistan, Turkestan), Saudi Arabia, Kuwait, northern India. *S. clydei* has not previously been found in Egypt.
This species is recorded from southern Sinai and is likely to occur in Upper Egypt because it also is known from Wadi Halfa in Sudan, near the Egyptian–Sudanese border (Lewis & Kirk, 1954).

S. clydei is very closely related to *S. adleri* and there has been much discussion on whether they are conspecific. Quate (1964) treats them as separate species but concludes 'I suspect they eventually will be shown to be two forms of the same species'. Lewis & Buttiker (1980) also considered them as separate species and stressed the importance of females as a means of identification. Later (Lewis & Buttiker, 1982) they confirmed their earlier proposition by finding distinct specimens representing each species at a single locality (Artawiyah, Saudi Arabia). The two species are distinguished by the number of horizontal and vertical teeth on the cibarium, *S. adleri* having a higher number than *S. clydei* (summarised in Table 3). The form of *S. clydei* originally described as *latiterga* Theodor has the sixth abdominal segment much larger than the fifth (up to twice the length and width). This form was originally considered a distinct species but was subsequently synonymised by Theodor & Mesghali (1964: 297). Form *latiterga* has not been found in Egypt.
S. clydei is unusual in that it is one of several species of *Sergentomyia* which bite man (Quate, 1964), the remaining species of the genus feeding on lizards. *S. clydei* has been used to transmit experimentally *Le.*

Table 3 Differences in the number of cibarial teeth in female *S. adleri* and *S. clydei*.

	Sergentomyia clydei		*Sergentomyia adleri*	
	number of horizontal teeth	number of vertical teeth	number of horizontal teeth	number of vertical teeth
This study Sinai	14 (13–16) sd. = 1·09	31·5 (25–37) sd. = 3·7	—	—
Quate, 1964 Sudan	10–16	16–34	n.g.	45–80
Lewis, *et al.*, 1980 Saudi Arabia	12–17	26.2 (15–46)	18·8 (16–24)	43–50
Lewis, *et al.*, 1982 Saudi Arabia	12–13	16–34	22	45–80

n.g. = not given.

adleri from lizards to man, causing a transient infection and giving immunity against one form of *Le. donovani* (Garnham, 1971).

Sergentomyia fallax (Parrot)

(Figs 58–60)

Phlebotomus minutus var. *fallax* Parrot, 1921*a*: 37 [♂]. Syntypes, ALGERIA, TUNISIA (IPA).
Phlebotomus fallax (Parrot); Parrot, 1921*b*: 99. [Raised to species.]

This species is currently placed in the subgenus *Sergentomyia*.

FEMALE. Cibarium with deeply concave row of 16–23 unequal, closely packed, delicate teeth, lateral teeth larger than medial teeth, pigment patch usually ovoid, posterior margin not indented (Fig. 60). Pharynx variable in shape but typically cordiform with distinct posterior notch, posterior teeth punctiform, very much smaller than slender anterior teeth (Fig. 59). Length of A3 0·11 mm (s.d. = 0·009, range 0·083–0·113, n = 10). Spermathecae simple.
MALE. Cibarium with concave row of unequal pointed teeth; pigment patch circular or oval. Pharynx slender, narrowing posteriorly, with distinct triangular teeth. Aedeagus broad, finger-shaped. Coxite and style long and slender, style more than five times as long as wide (Fig. 58), accessory seta subterminal, distance from setal base to closest terminal spine not greater than length of accessory seta.

MATERIAL EXAMINED

Egypt. Sinai: 1 ♂, 1 ♀, Feiran, 12–13.vi.1979 (*Y.B.*); 2 ♀, Ain Higia, 9–10.vi.1979 (*Y.B.*); 2 ♂, 6 ♀, Tharfet el Qidren, 13–14.vi.1979 (*Y.B.*); 3 ♂, 9 ♀, Upper Wadi Nasb, 14–15.vi.1979 (*Y.B.*).

DISTRIBUTION. From West Africa to eastern Afghanistan, and North Africa from Algeria to Egypt. This is the first record of this species from Egypt.

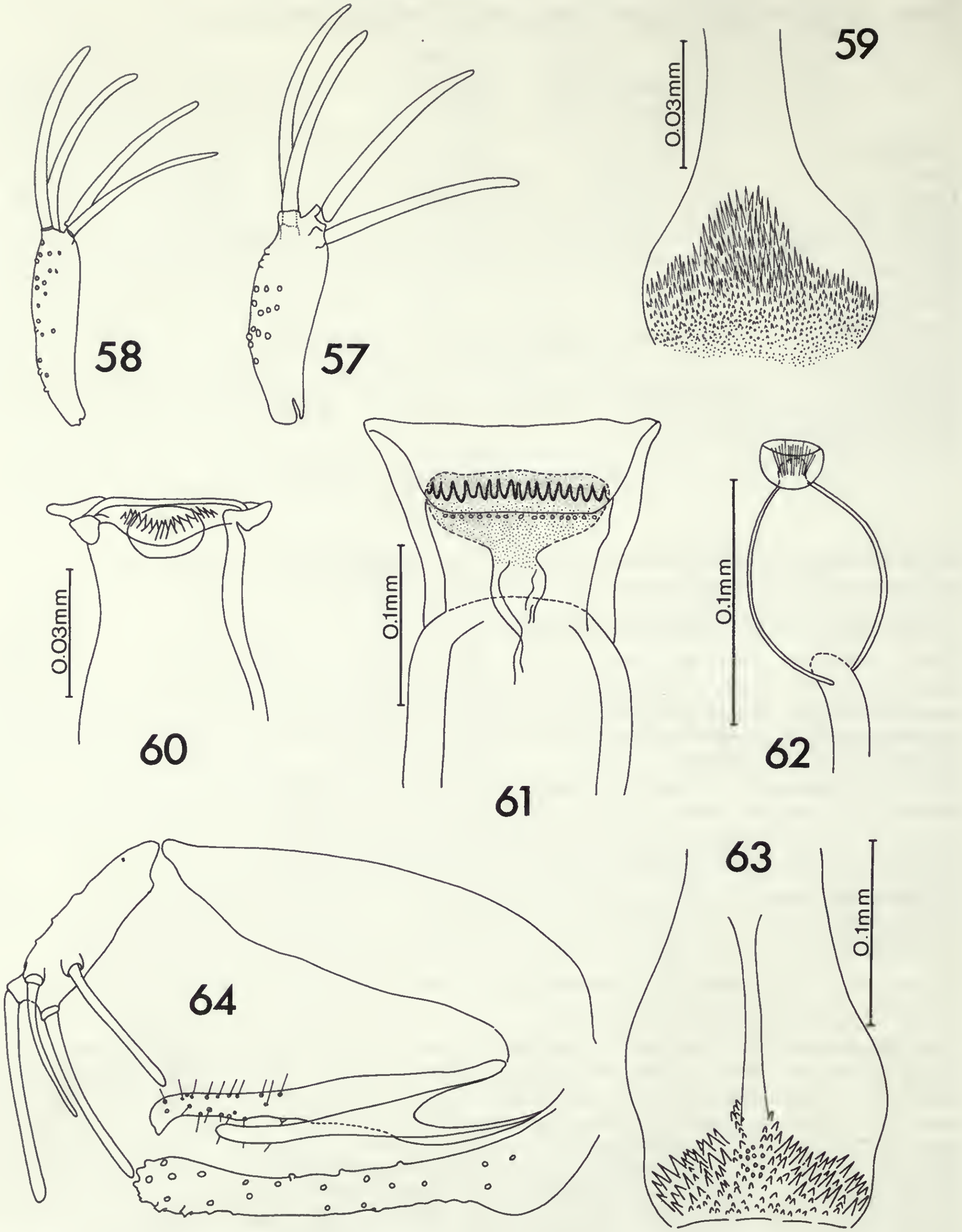
S. fallax has been divided into three subspecies: *S. fallax cypriotica* Theodor, *S. fallax afghanica* Artemiev and *S. fallax fallax* (Parrot), principally based on absolute size. Thus Lewis (1974*b*) discriminated between females of *S. fallax cypriotica* and *S. fallax fallax* on the size of the third antennal segment, 0·07–0·10 mm and 0·12–0·15 mm respectively (males cannot be reliably separated). The specimens from Sinai have a mean A3 length of 0.11 and therefore are intermediate between the two 'subspecies'. Furthermore, in this character the Sinai specimens are similar to those from Yemen which also have a A3 mean length of 0·11 mm (range 0·09–0·12 mm) (in Lewis, 1974*b*: 192). Until a study is made of this species throughout the whole of its geographical range the validity of these subspecies must remain in doubt.

Sergentomyia minuta (Rondani)

Hebotomus minuta Rondani, 1843: 265 [♂]. Type(s) ITALY (depository unknown).

This species is currently placed in the subgenus *Sergentomyia*.

FEMALE. Cibarium with a row of long, fine parallel teeth, row slightly convex posteriorly; pigment patch dark, transverse-ovoid, almost as wide as tooth row. Pharynx narrowing markedly after posterior bulge; armature of numerous individual teeth. Spermatheca simple, tubular.
MALE. Cibarium with vague row of irregular triangular teeth. Pharynx slender with ridged armature.



Figs 57–64 57, *Sergentomyia antennata* ♂, style, Sinai, 30° 50′N 34° 20′E. 58–60, *S. fallax*. (58) ♂, style, Sinai, Tharfet el Qidren; (59) ♀, pharynx; (60) ♀, cibarium. (Figs 59, 60 Sinai, Upper Wadi Nasb.) 61–64, *S. palestinensis*. (61) ♀, cibarium, Aswan; (62) ♀, spermatheca, Iraq, Jadizyah; (63) ♀, pharynx, Wadi Gaamah; (64) ♂, genitalia, Baharia Oasis.

Aedeagus finger-shaped, tapering. Style with four terminal spines, distance from accessory seta to terminal spine greater than length of seta.

MATERIAL EXAMINED

Examples of this species from Egypt have not been examined. Some specimens of 'minuta' collected by Eflatoon in 1922 are reported by Zein el Dine (1972) to be in the Egyptian Entomological Society, Cairo, but no further details are given. It is possible that these specimens were misidentified because *S. minuta* has not been collected in any sandfly surveys since. However, as *S. minuta* occurs around most of the Mediterranean Basin it is equally possible that this species will be found in the more humid areas of coastal Lower Egypt.

DISTRIBUTION. Portugal, Spain, France, Italy, Malta, Yugoslavia, Greece, Cyprus, Tunisia, Algeria, Morocco, Egypt (?).

Two subspecies have been described: *S. minuta minuta* from continental Europe, with a mean cibarial tooth number of 40; and *S. minuta parroti* (Adler & Theodor, 1926) from North Africa, with 70 teeth (Theodor, 1958; Rioux & Golvan, 1968). Recent work by Belazzoug *et al.* (1982) in different ecological zones of Algeria has shown that the number of cibarial teeth varies according to certain climatic factors (mainly humidity).

Sergentomyia palestinensis (Adler & Theodor)

(Figs 61–64)

Phlebotomus palestinensis Adler & Theodor, 1926: 64. Holotype ♀, PALESTINE (BMNH).
Phlebotomus lewisi Parrot 1948: 125. [Synonymised by Lewis & Büttiker, 1982: 370.]

This species is currently placed in the subgenus *Parrotomyia* Theodor.

FEMALE. Cibarium with straight row of 18–19 strong, straight, subequal horizontal teeth and a single row of vertical teeth; pigment patch broad, occupying most of cibarium width and with flattish posterior margin; cornua large (Fig. 61). Pharynx broad with distinct radiating teeth posteriorly (Fig. 63). Spermatheca tubular, capsule with thickened walls; collar surrounding spermathecal head well developed and often pigmented (Fig. 62).

MALE. Cibarium with straight row of 16 delicate horizontal teeth and a single row of vertical teeth. Pharynx with only slight constriction after post-medial bulge; armature with series of weakly developed scales posteriorly. Parameres simple, almost as long as surstyles, with hooked tips (Fig. 64).

MATERIAL EXAMINED

Egypt. 1 ♀, Aswan, Elephantine Island, sticky trap amongst rock by riverine vegetation, 3–5.x.1983 (*R.P.L.*); 1 ♀, 5 ♂, Baharia Oasis, 15.v.–7.viii.1971 (*K.Z.D.*); 2 ♀, Dakhla Oasis, Rashda, 17.viii.1971 (*K.Z.D.*); 2 ♀, Sinai, Tharfet el Qidren, 13–14.vi.1979 (*Y.B.*).

DISTRIBUTION. Egypt, Israel, Iraq, Iran, Saudi Arabia, Pakistan, Sudan, Ethiopia. Zein el Dine (1972) recorded this species from Dakhla and Baharia oases.

This species may be separated from other species of the subgenus *Parrotomyia* by the shape and number of pharyngeal teeth in both sexes, and by the shape of the spermathecal capsule and collar in the female.

Sergentomyia schwetzi (Adler, Theodor & Parrot)

(Fig. 65–67)

Phlebotomus schwetzi Adler, Theodor & Parrot, 1929: 75 [♂♀]. Syntypes, CONGO (BMNH).

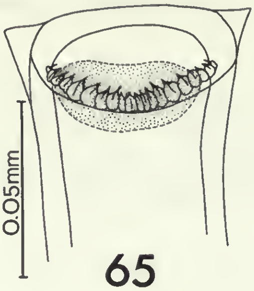
This species is currently placed in the subgenus *Sergentomyia*.

FEMALE. Cibarium with 13–22 horizontal teeth, lateral teeth larger and broader than central (Fig. 65). Pharynx narrowing posteriorly with an armature of broad scales. Spermatheca simple, tubular and smooth-walled.

MALE. Cibarium with concave row of large irregular teeth. Aedeagus finger-like with gentle ventral curve (Fig. 67); style with two apical and two subapical spines at about 0·75 length of style (Fig. 66).

MATERIAL EXAMINED

Egypt. 1 ♀, Aswan, Elephantine Island, 3–5.x.1983, sticky trap (RPL).



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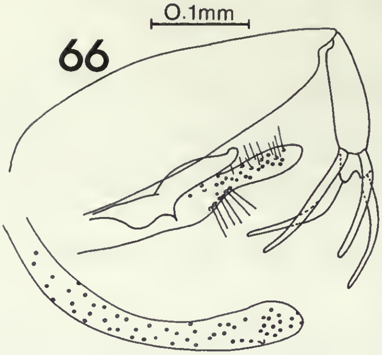

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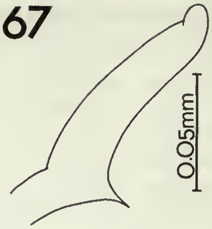

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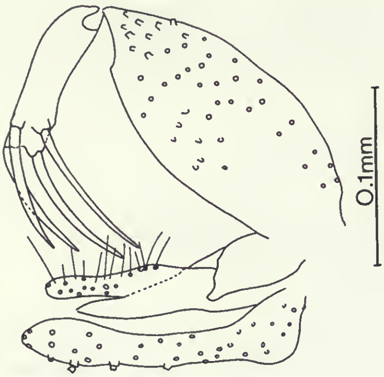

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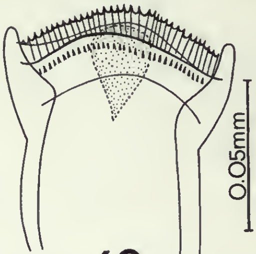

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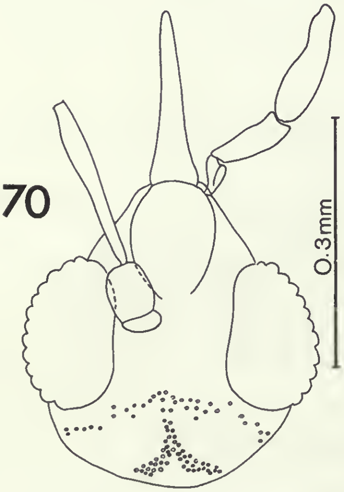

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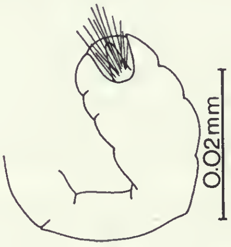

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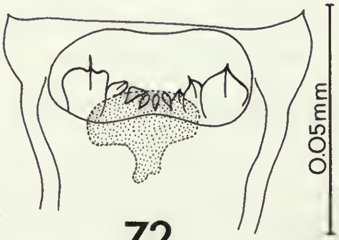

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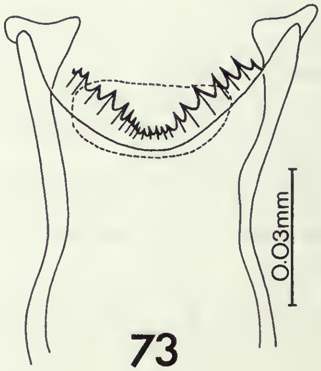

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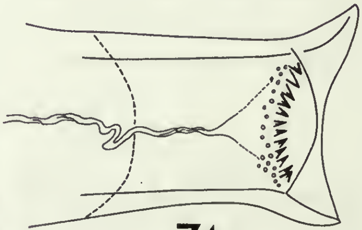

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Figs 65–74 65–67, *Sergentomyia schwetzi*. (65) ♀, cibarium, Aswan; (66) ♂, genitalia; (67) ♂, aedeagus. (Figs 66, 67 S. Sinai.) 68, 69, *S. squamipleuris*. (68) ♂, genitalia, Cairo; (69) ♀, cibarium, Kuwait. 70–72, *S. taizi*. (70) ♀, head; (71) ♀, spermatheca; (72) ♀, cibarium. (Figs 70–72 Sinai, Mt Katherine.) 73, *S. theodori* ♀, cibarium, Gaza. 74, *S. tiberiadis*. ♂, cibarium. (Fig 74, Aswan.)

Distribution. Widespread in Africa, Yemen, Saudi Arabia. This is the first record of this species from Egypt.

Sergentomyia squamipleuris (Newstead)

(Figs 68–69)

Phlebotomus squamipleuris Newstead, 1912: 366 [♀]. Syntypes, Sudan (BMNH).

This species is currently placed in the subgenus *Grassomyia* Theodor.

Female. Cibarium with convex row of fine, parallel horizontal teeth; undulating row of vertical teeth; pigment patch small, tapering anteriorly; broad, chitinised, transverse band present (Fig. 69). Pharynx tapering abruptly posteriorly, with rows of angular teeth. Spermatheca single capsule with dense covering of fine ductules.

Male. Cibarium with slightly convex row of minute triangular teeth; faint pigment patch present, almost circular. Pharynx narrow, tapering posteriorly. Coxite broad, style with two spines terminal, two subterminal. Paramere thick, bluntly rounded. Aedeagus tapering gently from base to three-quarters of length, then tapering abruptly (Fig. 68), dorsal margin concave. Surstyles short and thick, as long as coxite.

Material examined

Egypt. 1 ♂, Cairo, 1.xi.1910 (*Wakeling*); 1 ♀, Aswan, xi.1969 (*M.A.R.*).

Distribution. Most of Africa (including Egypt), Israel, Iraq, Iran, Saudi Arabia, Kuwait. Khalil (1934) found this species in Sharqia Governate and Rifaat *et al.* (1968) recorded it but gave no localities.

Sergentomyia taizi (Lewis)

(Figs 70–73)

Sergentomyia (Sergentomyia) taizi Lewis, 1974*b*: 193 [♂♀]. Holotype ♀, Yemen (BMNH).

This species is currently placed in the subgenus *Sergentomyia.*

Female. Cibarium with nine teeth, two outer teeth broad, scale-like. Pigment patch dark, less than half width of cibarium, with rectangular anterior projection (Fig. 72). Pharynx with numerous fine transverse ridges posteriorly, bearing small distinct teeth. In holotype, pharynx tapers posteriorly but not in Sinai specimens (possibly artefact of preparation). Spermatheca broad, tubular, with apical knob in depression (Fig. 71).

Male. Cibarium with concave row of teeth, outer teeth large, scale-like. Style with all spines terminal.

Material examined

Egypt. 1 ♀, Sinai, St Katherina, 15–16.vi.1979 (*Y.B.*).

Distribution. Yemen, SW. Saudi Arabia, Egypt. This is the first record of this species from Egypt.

This species was described from the mountainous areas of Yemen and only subsequently found in the continguous mountain chain in Asir (SW. Saudi Arabia).

Sergentomyia theodori (Parrot)

(Fig. 73)

Phlebotomus minutus (Rondani) sensu Adler & Theodor, 1926: 403 [♂♀]. Misidentification.
Phlebotomus (Prophlebotomus) theodori Parrot, 1942: 322. Syntypes, Palestine: Jericho (BMNH).

This species is currently placed in the subgenus *Sergentomyia.*

Female. Cibarium with 20–22 sharply pointed horizontal teeth in concave row, lateral teeth at least twice as long as central teeth (Fig. 73); pigment patch broad, almost as wide as cibarium and approximately rectangular. Pharynx triangular, posterior margin concave or notched; anterior teeth long and slender, posterior teeth appear shorter as they are usually viewed at an acute angle.

Male. Cibarium with concave row of pointed teeth, lateral teeth much longer than tightly packed medial teeth. Pharynx narrowing after posterior bulge (lamp-glass shaped), with fine teeth. Style 4–5 times as long as wide; accessory seta further from apex than length of seta.

MATERIAL EXAMINED

Egypt. 2 ♂, 4 ♀, Gaza, vii.1940 (*O. Theodor*).

DISTRIBUTION. Yugoslavia, Turkey, Lebanon, Syria, Israel, Cyprus, Egypt, Iraq, Iran, Pakistan, N. India, Afghanistan. This is the first record of this species from Egypt.

Sergentomyia tiberiadis (Adler, Theodor & Lourie)

(Figs 74–77)

Phlebotomus tiberiadis Adler, Theodor & Lourie, 1930: 537 [♂♀]. Lectotype ♀, PALESTINE (BMNH), designated by Lewis & Büttiker (1982: 367).

This species is currently placed in the subgenus *Sintonius*.

FEMALE. Head narrow. Cibarium with straight row of about 16 strong, curved, closely packed horizontal teeth; these characteristic teeth may appear straight in some poorly mounted specimens; two or three rows of distinct vertical teeth; pigment patch broad, almost as wide as tooth row (Fig. 77). Pharynx slender with barely discernible armature in form of transverse striations. Spermatheca with 6–8 segments.

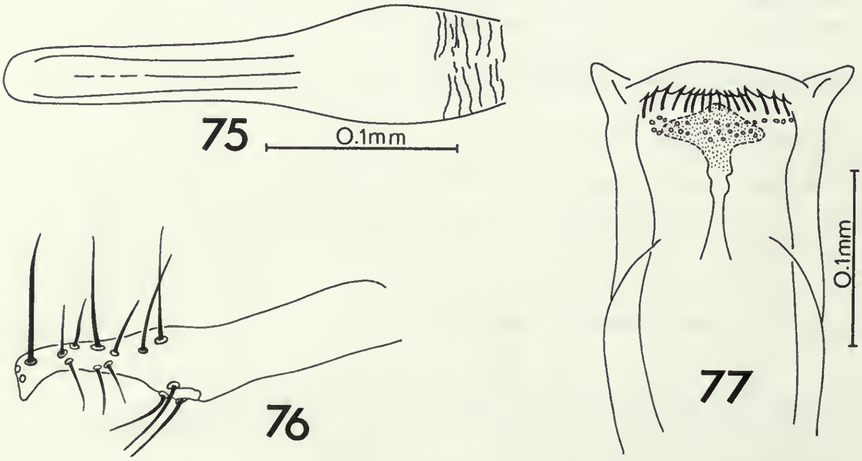
MALE. Cibarium with a row of 12–14 curved horizontal teeth and one or two rows of vertical teeth (Fig. 74); pigment patch vague, almost as wide as tooth row. Pharynx slender, gently narrowing after bulge; armature a series of indistinct ridges (Fig. 75). Paramere with distinct beak apically (Fig. 76). Style with two apical, two subapical spines. Aedeagus slender, tapering from base.

MATERIAL EXAMINED

Egypt: 1 ♂, Aswan Governate, Aswan, Elephantine Island, 3–5.x.1983, sticky traps amongst rocks (*R.P.L.*); 2 ♂, Aswan, xi.1967 (*M.A.R.*); 2 ♂, Luxor, 8.xi.1966 (*Z.A.H.*).

DISTRIBUTION. Egypt, Israel, Djibouti, Ethiopia, South & North Yemen, Sudan. Rifaat *et al.* (1968) record this species from Egypt but give no specific locality.

This species is easily distinguished from *S. christophersi* and *S. clydei* by the shape and number of cibarial teeth in the male and female. The Oriental subspecies *S. tiberiadis pakistanica* Artemiev & Saf'yanova differs from the nominate subspecies in the spermathecal capsule which narrows towards the tip and has more segments (9–12), and the lower mean number of cibarial teeth (13 compared to 17–18). The subspecies *pakistanica* is restricted to Pakistan and Afghanistan.



Figs 75–77 *Sergentomyia tiberiadis*. 75, ♂, pharynx; 76, paramere; 77, ♀, cibarium. (Aswan.)

Faunal associations

Based on the distributions of sandflies collected in Egypt and described above, the fauna can be divided into three distinct elements. Each element has affinities to faunas in areas outside Egypt and these are discussed below and compared to the distribution of other insects.

Elements of the Egyptian sandfly fauna

Each of the three faunal elements is composed of a characteristic, although not mutually exclusive, group of species. The areas occupied by these three faunal elements are:

Mediterranean/Lower Egypt element: coastal Egypt, Siwa Oasis, the Delta and Nile valley as far south as Asyut, and northern Sinai.

Upper Egypt: Nile valley to Lake Nasser and the oases of Bahariya, Farafra, Dakhla and Kharga.

S. Sinai: the mountain system from Gebel el Igma southwards to Sharm el Sheikh.

The fauna of the mountainous southern Sinai is clearly distinct from that of northern Sinai, which has a typical lowland Middle Eastern fauna composed of *P. papatasi* and *S. antennata*.

The species representing each of the three faunal elements are listed on pages 4–5. All are restricted to their component areas except *P. papatasi, P. sergenti* and *S. palestinensis*, which are widespread in distribution. *P. papatasi* is the only species found predominantly in peridomestic habitats.

Clearly, this division of the fauna into three elements is greatly influenced by the distribution of collecting sites, and at present it is not possible to delimit precisely each area. For example, the Upper Egypt component is based on collecting around Aswan and in the Kharga and Dakhla oases, but the extent to which the species of this area penetrate northwards along the narrow riverine vegetation to Beni Suef and Faiyum in Lower Egypt is unknown. The faunas of Upper and Lower Egypt (including northern Sinai) are more similar (i.e. have more species in common) to each other than either is to the southern Sinai fauna, presumably because of the Nilotic connection suggested above, and the presence of high mountains in southern Sinai and associated habitats not available in the rest of Egypt. Several geographically important areas need to be surveyed to complete the faunistic picture of Egyptian sandflies, particularly the remote wadi systems of the southern Sinai and Upper Egypt, the oases of Siwa and Farafra, and the Red Sea Hills.

The largest and most diverse faunal component in Egypt is that of the southern Sinai, with 12 species (6 *Phlebotomus*, 6 *Sergentomyia*) compared to the six (1 *Phlebotomus*, 5 *Sergentomyia*) found in Upper Egypt and eight (3 *Phlebotomus*, 5 *Sergentomyia*) in the Mediterranean/Lower Egypt component.

It is not clear which environmental factors have the greatest effect on the distribution of different sandfly species, although it is clear that some species have a marked association with a particular habitat. Vegetation affects sandfly distribution indirectly through its effect on the hosts of sandflies, which can be either carnivores (dogs, foxes etc.), herbivores (rodents) or man and domestic animals (goats, poultry). However, the presence of some plants may be important as sources of sugar meals for the adults. The shade provided by vegetation probably has a minimal direct effect on sandfly distribution as sandflies rarely use plants as resting sites (e.g. tree holes) in arid regions, although vegetation structure clearly has an effect on some sandfly hosts. Temperature has some rôle in governing distribution because some species found in the high mountains of the southern Sinai (e.g. Gebel Katherina which rises to 2637 m) are exposed, during the winter snowfall, to low temperatures which would be fatal to other species.

Association of Egyptian fauna with neighbouring areas

Throughout this discussion, the affinity of the different elements of the Egyptian fauna with the faunas of neighbouring areas is measured by the number of species they share. Figs 78–80 summarise the proportion of each faunal element found in seven neighbouring areas. Several factors affect these estimates of affinity, including the number of species in a faunal element, differences in the taxonomic status of a species (e.g. *S. cintus* is treated as a distinct species here but as a synonym by some authors) and differences in sampling (some areas are better known than others). Hence, such estimates, like so many others which take no account of relative abundance of species or the range of habitats available in an area, can only be used to give a general impression of the affinity of faunas.

The Southern Sinai is known as an area of endemicity in some groups, e.g. Lepidoptera and Orthoptera, but it does not have any endemic sandflies. However, the Sinai populations of some species show subtle morphological differences from populations in other parts of their range, e.g. *P. orientalis* and *P. major*. More refined taxonomic techniques may demonstrate substantial differences. the lack of endemicity in sandflies may be because the group is well adapted, even common, in arid areas and therefore the deserts of the region do not pose a very significant barrier to dispersal and introgression of populations as they do in most other groups of insects.

The sandfly fauna of the southern Sinai shows a marked affinity with the fauna of the Arabian Peninsula (see Lewis & Buttiker, 1982), particularly Asir, Yemen (*in* Lewis, 1974*b*) and, to a lesser but still significant extent, to the highlands of eastern Africa (Table 4; Fig. 80). The mountains of the southern Sinai represent an isolated part of a tongue of the Afrotropical Region extending northwards to the end of the Rift Valley System in northern Israel (Upper Galilee). The principal species indicating this association are *P. arabicus, P. orientalis, P. kazeruni, S. taizi* and *S. adleri*, which dominate the fauna of south-west of the Arabian Peninsula and are closely related to species in the Afrotropical Region. The absence of the common Palaearctic *P. papatasi* further supports this association and the conclusion that sandflies of these highland areas are a distinct part of the Afrotropical fauna and not a relict intrusion of the Palaearctic fauna. *S. taizi* has only been found in the mountains of Yemen (near Ta'izz) and at the top of Gebel Katherina. Unlike parts of the sandfly fauna of the Arabian Peninsula, the Sinai fauna does not contain any Oriental species, although some species are east European/west Asian (*P. alexandri, P. kazeruni*). Therefore the southern Sinai does not constitute part of the Triad Zone as defined by Lewis & Büttiker (1980).

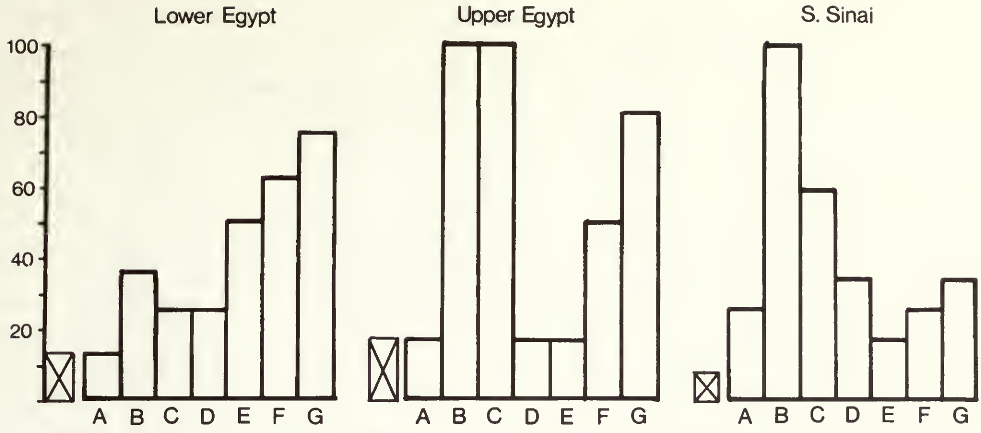
The sandfly fauna of Upper Egypt has affinities with both the Arabian peninsula and the Sahel of Africa, through species such as *S. christophersi, S. clydei, S. adleri, S. schwetzi* and *S. tiberiadis* (Table 4; Fig. 79). *P. papatasi* is not typically African and its presence in Upper Egypt is part of a southernly extension of its range along the Nile Valley as far as northern Sudan.

Sandflies of Lower Egypt and the northern Sinai are typical of the North African and eastern Mediterranean faunas (Table 4; Fig. 78). The rarity of *P. langeroni* has already been noted (p. 11). Its presence in Egypt indicates that it may be widely distributed along the North African coast, perhaps in association with outcrops of limestone which are such a feature of the area in Egypt where it is comparatively common. *S. squamipleuris* is a member of a species group widely distributed along a band south of the Sahara, through the Arabian Peninsula and into northern India. Its presence in Lower Egypt represents a northerly extension of its range, in contrast to that postulated above for other species (e.g. *P. papatasi*). *S. squamipleuris* is more rigidly confined to the riverine vegetation along the Nile than are many other sandflies, where it feeds on amphibians.

Distribution of insects other than sandflies

The comparison of distribution patterns of sandflies with those of other biting flies (Simuliidae, Ceratopogonidae and Culicidae) is germane to understanding sandfly faunal associations, because these other flies also are influenced by the search for hosts. However, other biting flies are restricted environmentally by the need for free water (running water in Simuliidae) for the development of the immature stages.

The mosquito *Culex sinaiticus* Kirkpatrick was thought to be confined to southern Sinai, but was later found in Eritrea and northern Sudan (Red Sea coast around Port Sudan and in central Sudan) (Lewis, 1956), although it has not been found elsewhere in Egypt. A similar situation is found in *Culex arbieeni* de Meillon which is known from southern Sinai and the upper slopes of



Figs 78–80 Histograms showing the percentage of the species from Lower Egypt (78), Upper Egypt (79) and southern Sinai (80) which also occur in neighbouring areas.
A = east Saudi Arabia + Iran; B = south-west Saudi Arabia + Yemen + Ethiopia; C = Sudan; D = Sahel; E = north Africa; F = Israel; G = east Mediterranean. X = one species as percentage of total number in faunal element.

the Marra mountains in west Sudan (Lewis, 1954). In the Simuliidae, only two species are known from Egypt. *Simulium griseicolle* Becker which breeds in large rivers in Africa, has only been found once in Egypt, at Aswan, its type-locality. The second species, *Simulium ruficorne* Macquart, has a very wide distribution throughout the savannah areas of Africa (south of the Sahara), North Africa, Spain and African islands. It is not clear whether it is an Afrotropical or Palaearctic species but it probably represents a species complex. Specimens of *S. ruficorne* from Feiran Oasis in southern Sinai are similar in their pupal gill structure (Crosskey, pers. comm.) to specimens from Israel and the Hejaz. Unfortunately very little is known of the Egyptian Ceratopogonidae, particularly *Culicoides*, but the known fauna, based on collecting in the Delta, is Palaearctic. Thus the faunal associations of other biting flies are broadly concordant with those of the Egyptian sandflies, showing connections between Sinai and the Afrotropical Region, and Lower Egypt and the Palaearctic Region.

As noted above, southern Sinai is a known area of endemicity in other insect orders. For example, Uvarov (1929) studied a small collection of Orthoptera from southern Sinai and drew the following conclusions: ‘in general composition the known fauna of the Sinai peninsula is clearly a local division of the Palaearctic eremian fauna . . . it possesses certain features of its own [endemics]. The Sinai peninsula must be regarded as one of the dry mountainous centres where an ancient Mediterranean fauna survives, where the present eremian fauna was born and developed and from where it spread over the whole great desert belts . . . the Sinai fauna has a close similarity, perhaps an intimate relation to that of Arabia’ [although at the time the latter fauna was very poorly known].

In a comprehensive account of the biogeography of Arabian butterflies, Larsen (1984) makes relatively little comment on the Egyptian fauna other than that it is typical of the ‘Palaearctic eremic zone’. However, there are several endemic species of butterflies in the southern Sinai massif.

In conclusion, the sandfly fauna of Egypt is exceptional, compared to the sandfly fauna of other countries, in being so clearly divided into Afrotropical and Palaearctic elements. Whether Egypt and surrounding areas have always been a point of faunal exchange of sandflies between the two zoogeographic regions, with the Nile valley and the mountains of the Red Sea coast and Sinai acting as major dispersal routes, is not clear. Lewis (1982) has suggested that the genus *Phlebotomus* is Palaearctic in origin and subsequently extended southwards into Africa during the pluvial periods, presumably through the Nile and Rift valleys. However, the Sahara desert

Table 4 Comparison of the species shared between each of the three components of the Egyptian sandfly fauna and the faunas of neighbouring areas.

Neighbouring area	Egyptian faunal component		
	Lower Egypt	Upper Egypt	S. Sinai
E. Saudi Arabia/Iran	*P. papatasi*	*P. papatasi*	*P. kazeruni* *S. fallax* *S. christophersi*
SW. Saudi Arabia/Yemen/ Ethiopia	*P. papatasi* *P. sergenti* *S. cincta*	*P. papatasi* *S. christophersi* *S. palestinensis* *S. schwetzi* *S. tiberiadis*	*P. arabicus* *P. alexandri* *P. kazeruni* *P. major* *P. orientalis* *P. sergenti* *S. adleri* *S. clydei* *S. fallax* *S. palestinensis* *S. schwetzi* *S. taizi*
Sudan	*P. papatasi* *S. cincta*	*P. papatasi* *S. christophersi* *S. palestinensis* *S. schwetzi* *S. tiberiadis*	*P. orientalis* *S. adleri* *S. christophersi* *S. clydei* *S. fallax* *S. palestinensis* *S. schwetzi*
Sahel	*S. antennata*	*S. schwetzi*	*P. orientalis* *S. adleri* *S. clydei* *S. schwetzi*
North Africa	*P. langeroni* *P. papatasi* *P. sergenti* *S. minuta*	*P. papatasi*	*P. alexandri* *S. fallax*
Israel	*P. papatasi* *P. sergenti* *S. theodori* *S. antennata*	*P. papatasi* *S. palestinensis* *S. tiberiadis*	*P. alexandri* *P. sergenti* *S. fallax*
E. Mediterranean	*P. papatasi* *P. sergenti* *S. theodori* *S. antennata* *S. squamipleuris* *S. minuta*	*P. papatasi* *S. palestinensis* *S. squamipleuris* *S. tiberiadis*	*P. alexandri* *P. sergenti* *S. fallax* *S. palestinensis*

has not always been such a barrier to dispersal and possibly, in an arid-adapted group such as the sandflies, substantial dispersal may have taken place either through or around the Sahara. A more comprehensive study of sandflies throughout the whole of the Eremic Zone (Morocco to Afghanistan) is required to answer these questions fully.

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Fungus moths: a review of the Scardiinae (Lepidoptera: Tineidae)

G. S. Robinson

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Fungus moths: a review of the Scardiinae (Lepidoptera: Tineidae)

Gaden S. Robinson

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Synopsis

This paper gives an account of the subfamily Scardiinae, the fungus moths. The group is redefined and 111 species in 23 genera are ascribed to it. Its previous taxonomic history and its biological and morphological characteristics are reviewed. Le Quesne tests show homoplasy to be rampant in the Scardiinae. Numerical phylogenetic methods are used with the aim of deriving a phylogenetic classification; their results are contrasted with those from various phenetic methods. Character-compatibility analysis is used to pinpoint 'robust' characters with minimal homoplasy. Groups defined by such characters are found to be also 'robust', being revealed by most of the analytical methods employed. The shortest optimized Wagner tree is adopted as the classification but the limited phylogenetic implications of this classification are stressed. The biogeography of the group is reviewed. Keys are provided to genera and species. Eight genera are described as new and one genus is recalled from synonymy. Twenty-six new species are described and 18 species are placed in new generic combinations; four new synonymies are established.

Introduction

The subfamily Scardiinae includes more than one hundred species of generally large and robust tineid moths. While the smallest species have a wingspan of only about 12 mm, the largest Scardiinae are among the biggest ditrysian Microlepidoptera, with wingspans of up to 60 mm. Despite their size, however, Scardiinae are not conspicuous.

It is the biology of the Scardiinae that sets them apart, with one exception, from all other subfamilies of Lepidoptera. The larvae feed in either the fruiting body (sporophore) of persistent (hard) bracket-fungi, or in the wood of dead or moribund trees that has been permeated by the hyphae of such fungi. The traces left by feeding scardiinae larvae are characteristic – ramifying accretions of loosely webbed coarse frass forming a cover for surface and sub-surface feeding, usually combined with similar volcano-shaped accretions of frass or

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loose mounds above deeper tunnels. Larvae pupate just below the surface of the food-substrate. The mobile pupa is protruded half-way out of the substrate (using two rows of backward-pointed spines on each abdominal segment to force its exit) before it ruptures and the adult emerges.

Fungus-feeding Lepidoptera

Examples of fungivory are found throughout the Lepidoptera and the reader is referred to the recent review by Rawlins (1984) for further details. Within the Tineoidea fungivores are found possibly among the species of *Compsoctena* (Eriocottidae). Lichenivory, a form of fungivory, is widespread among Psychidae. The biology of one of the eight species of Arrhenophanidae is known and it is a fungivore, feeding on '*Polyporus* sp.' (Costa Lima, 1945; Becker, pers. comm.). Within the Tineidae fungivory is found in the subfamilies Hieroxestinae, Tineinae and Meessiinae (Lawrence & Powell, 1969); many other species of Meessiinae are lichenivores. However, apart from the Scardiinae, the tineid subfamily Nemapogoninae is the only other subfamily of Lepidoptera that feeds exclusively on fungi. Nemapogoninae are virtually restricted to the Holarctic region whereas Scardiinae are found also in both the Old and New World tropics. There is no obvious division of niche between the two groups but there is a considerable size difference, most adult Nemapogoninae having a wingspan of less than 18 mm, with the larvae being correspondingly smaller than those of Scardiinae.

General morphology

The wing patterns of most genera of Scardiinae are cryptic, taking the form of a mottled cream and brown pattern resembling moss or tree-bark. Other genera have disruptive patterns: the brown forewing with a pale apex and dorsum. A few genera have a bronze or golden forewing ground-colour blotched with dark brown. The *Morophaga bucephala*-group is quite atypical in having a conspicuously white forewing ground-colour with bold purple-brown markings. In *Amorophaga* the cryptic wing-pattern is corrupted by being drawn into longitudinal streaks.

The scardiine head carries the erect scales on frons and vertex typical of most tineid groups. The maxillary palpus is 5-segmented, elongate and folded in most species. The labial palpus is cylindrical, the second segment with only lateral bristles rather than lateral and terminal bristles as in, for example, the Tineinae. The antennal pecten may be very large with up to about 40 strong, bristle-like scales.

Most species are broad-winged and have all veins present. However, some have narrow forewings and in these one or two pairs of veins are stalked. The narrowing of the forewing is most extreme in *Diataga*, in which two pairs of veins are stalked. Externally, however, the morphology of adult Scardiinae is conservative and, with the exception of the enlarged antennal pecten (not found in all scardiinae genera but not known from any other tineid), no adult character or combination of characters can be used to define the group. It is the larva that provides the single defining character of the Scardiinae (see below).

History of classification of the Scardiinae

Although Eyer (1924) is the first recorded user of the family-group name Scardiinae, the association of typical scardiine taxa was well-established by earlier authors (e.g., for the New World, by Dietz, 1905, and Walsingham, 1914). No significant usage of the family-group name occurred again, however, until Hinton (1955; 1956) emphasized the characteristic for defining *Scardia* (i.e., *Scardia s.l.: Morophaga* + *Scardia* + *Morophagoides*) and its allies as a discrete group.

The larvae of Scardiinae differ from those of all other Tineoidea in that the prothorax bears only two L-group setae. All other known tineid larvae have three L-group setae. The generality of this important character within the Scardiinae is, however, uncertain as larvae of only *Morophaga, Diataga, Scardia, Daviscardia* and *Morophagoides* are known. The characteristic larval setation was first noted by Gerasimov (1937) in *Scardia*. Fracker (1915) had earlier figured the larva of *Scardia anatomella* but with three prothoracic L-group setae. However, this was probably an error as later workers (Kuznetzov, 1941; Hinton, 1956) found only two. Kuznetzov (1941), finding a fossil larva with only two L-group setae, searched for this character among other Tineidae and confirmed it in *Morophaga choragella* (as *boleti*), *Scardia boletella, S. anatomella* and *Daviscardia coloradella*. Strangely, his mention *en passant* of *coloradella* is the only reference to the setal pattern of this species and confirms the bisetose prothoracic L-group in *Daviscardia*.

Amsel (1952) figured the genitalia of the few European species of Scardiinae. Petersen (1957) placed together all those Palaearctic species of Scardiinae then recognized and described the genitalia. He later (Petersen, 1959; 1960) described two new species and revised those known to him.

Zagulajev (1965; 1966; 1968) described a number of new species from the Caucasus and from the easternmost provinces of the U.S.S.R. and later (Zagulajev, 1973) combined and expanded his earlier work into a full-scale monograph of the Palaearctic Scardiinae. This work remains the primary reference to the group in this area and no attempt is made here to duplicate its content. Gozmány & Vári (1973), in their monograph of the Afrotropical Tineidae, also recognized the subfamily as discrete and revised the Afrotropical species. Their concept of the Scardiinae was, however, broader than that of other authors. They included *Afrocelestis*, *Ateliotum* and *Pelecystola*, genera placed by other authors as Meessiinae (*Afrocelestis*) and Myrmecozelinae (*Ateliotum* and *Pelecystola*), placements that I endorse. They also erected a further subfamily, the Tinissinae. Three years later I revised this diverse group of predominantly south-east Asian species (Robinson, 1976*a*) and later proposed a phylogeny for the group, drawing attention to its morphological similarities to the Scardiinae and suggesting that the Scardiinae might be paraphyletic with respect to the Tinissinae (Robinson, 1981). This suggestion is supported in the present work and the Tinissinae are synonymized with the Scardiinae below.

Davis (1983) has provided an up-to-date list of the North American Scardiinae, including new synonymy: work in progress includes redescription of the North American Scardiinae (Davis, pers. comm.).

The action of Căpuşe (1971) in erecting the tribe Semeolonchini for the single genus *Semeoloncha* is based on no more than Gozmány's original description of the genus (Gozmány, 1968); no characteristics are offered to define the tribe and it is not placed in any higher taxonomic category.

Fossil 'Scardiinae'

Kuznetzov (1941), in his revision of the Lepidoptera of Baltic amber (~40 million years BP), described four genera (*Scardiites, Proscardiites, Palaeoscardiites* and *Glessoscardia*) and allied them with *Scardia* (and thus with the Scardiinae). Zagulajev (1966; 1973) agreed with Kuznetzov's placement. The first three genera were described from single adults, the last from a larva. The possibility that *Scardiites* is a monotrysian is suggested by a row of postfrenular bristles in Kuznetzov's illustration, the shape of the apex of the abdomen of *Proscardiites* suggests the possibility of its being a yponomeutoid (although the length of the maxillary palpi suggests otherwise), and the outline of the valva of *Palaeoscardiites* as figured by Kuznetzov is reminiscent of *Compsoctena* (Eriocottidae). There are no characters figured or cited by Kuznetzov to suggest affinity of *Scardiites, Proscardiites* or *Palaeoscardiites* to the Scardiinae. However, the larva, *Glessoscardia*, could well be a Scardiinae although from its size (only 9 mm long) it is unlikely to be mature. Kuznetzov noted that it had only two prothoracic L-group ('prestigmatal') setae.

General biology

A summary of the biologies of the Palaearctic Scardiinae (including novel information on some species, and figures of the larva and pupa of *Scardia boletella*) has been given by Zagulajev (1973). Powell ([1968]) and Lawrence & Powell (1969) bred Lepidoptera from a variety of dead wood and fungus samples in California. This rearing programme yielded a large number of new host records for North American Scardiinae. Much earlier, Walsingham (1882) described his experiences rearing *Scardia anatomella* in Oregon. Hinton (1956) has noted the few detailed descriptions of the biology of European species. Petersen (1969) has summarized records of the biology of *Morophaga choragella* (as *boleti*). More recently, Moriuti (1976) has described the life history of *Morophagoides moriutii* (as *ussuriensis*) and figured the larva and pupa.

Scardiinae are only rarely encountered in collections made at light (Robinson, 1981 – *Tinissa*). Sixteen nights' collecting at light in Brunei in 1982, for example, yielded 260 Tineidae of about 60 species: only six species and eight individuals were Scardiinae and all but one of those were *Tinissa* (Robinson, 1984). Species of Scardiinae of which large numbers are available have almost invariably been bred. Zagulajev (1973) has collected numbers of *Morophagoides iranensis* swarming at dusk near fungus-riddled trees and Fletcher (1933) collected *Morophaga cremnarcha* (q.v.) under similar circumstances. Other specimens have been collected at rest by day close to a putative food-substrate.

Scope and aims of the present study

The present study is intended to complement existing studies of the Palaearctic Scardiinae, notably that of Zagulajev (1973), by integrating the comparatively unstudied species and genera of the Old World tropics and of the New World with the Palaearctic taxa. In so doing, it has been necessary to revise substantially the existing classification of the Scardiinae and, to some extent, to adapt the restricted definition of the sub-family to accommodate the morphological differences of the extra-Palaearctic taxa.

The bibliography provided is limited in that references providing only minimal information (such as mention in checklists, or parochial distribution records of common European species) have been omitted. Zagulajev (1973) has collected together many references to European species and others are given by Petersen (see bibliography): they are not reiterated here.

This review is based primarily upon the collections of the British Museum (Natural History) but most specimens in the National Museum of Natural History, Washington, the University of California, Berkeley, and the Zoological Institute of the Academy of Sciences, Leningrad, have also been studied. Material in other institutions was requested selectively. Specimens in Leningrad and California and some of those in Washington were examined early on in the project and, at that time, not all the characters finally adopted for use in classification had been recognized. Where observations are deficient, this is stated.

Attempts to resolve a phylogeny for the Scardiinae have highlighted the problems caused by the high degree of homoplasy encountered. Gauld & Mound (1982) have drawn attention to this as a feature of several other insect groups and emphasized the difficulty in providing an acceptable generic classification in these circumstances.

The data set obtained in the course of this study has been used in the exploration of techniques for numerical classification by phenetic and cladistic methods using a microcomputer.

Terminology

The external and genital morphology of the Scardiinae is unexceptional and the terminology used here follows that of Common (1970) and Klots (1956). Further discussion of certain of the features examined is given under 'Characters used in classification'. In the male genitalia the uncus is composed of a pair of soft lobes: these may be more or less strongly sclerotized, may be fused with each other and/or with the tegumen, or may be widely separated. In my previous paper (Robinson, 1981) I adopted Kuznetzov & Stekolnikov's (1976; 1977) term 'tegumen lobes' for these, but their clear differentiation from the tegumen in all taxa examined, and their evident homology with the uncus of, for example, the Tineinae, make this term inappropriate and I here revert to my earlier (1976*a*) usage of 'uncus lobes'.

Techniques

Pinned adult specimens were examined at magnifications of ×6 to ×50 in artificial light using a

Wild M5 microscope. Venation, if not visible in oblique light, was examined by transmitted light after the wing had been wetted with toluene.

Size measurements given were made with a ruler and are those of a specimen set in conventional fashion; other comparative measurements were made using an eyepiece graticule on a Wild M5 microscope.

The variety of male genital types in the Scardiinae required the utilization of a variety of techniques to display the characters adequately. General methods for the preparation of genitalia slides have been described by Clarke (1941) and Robinson (1976*b*). For certain Scardiinae it was necessary to employ the technique of cutting the vinculum laterally and unrolling the genital armature as described previously for *Tinissa* (Robinson, 1976*a*). In other groups the internal surface of the uncus lobes and valvae could be displayed simply by folding the valvae ventrad and forward and splaying them slightly. In other groups it was necessary to dissect away one valva and mount it separately. Chlorazol Black E (Azo Black) was employed as a stain for preparations made early on in this study but this was superseded by Mercurochrome. I now prefer the latter stain as it is more controllable and consistent. Although not applicable to this study, it also offers better photomicrographic results.

Preparations were examined and drawn using a Wild M5 stereoscopic microscope with camera lucida drawing attachment. More detailed examination was carried out with a Leitz Ortholux microscope using phase-contrast and magnifications to ×600. Phase-contrast was particularly useful in identifying microtrichia lining the vesica or the ductus bursae, in identifying the sensilla on the eighth tergite of females, and in locating and counting the setae on the abdominal sternites.

Numerical analysis was carried out using a Commodore 64 microcomputer. Programs written by the author are in CBM BASIC; copies are available on request.

When a draft of this paper was completed, David Swofford's computer program 'PAUP' (Phylogenetic Analysis Using Parsimony – Illinois Natural History Survey) became available, running on the Rutherford Laboratory's IBM Multiprocessor. This program was used with multiple parsimony and global branch-swapping options.

Check-list of Scardiinae

- ***MOROPHAGOIDES*** Petersen, 1957
  - ***iranensis*** Petersen, 1960
  - ***ussuriensis*** (Caradja, 1920)
  - ***moriutii*** **sp. n.**
  - ***berkeleyella*** (Powell, [1968])
  - ***burkerella*** (Busck, 1904)
    - *gracilis* (Walsingham, 1907)
    - *caryophylella* (Busck, 1908)
    - *errandella* (Busck, 1908)
  - ***montium*** (Walsingham, 1914)
  - ***pythium*** **sp. n.**
  - ***nimbiferum*** **sp. n.**
  - ***iulina*** (Walsingham, 1914)

- ***MONTESCARDIA*** Amsel, 1952
  - ***tessulatellus*** (Zeller, 1846)
  - ***kurenzovi*** (Zagulajev, 1966) **comb. n.**
  - ***fuscofasciella*** (Chambers, 1875) **comb. n.**
    - *pravatella* (Busck, 1908)

- ***BYTHOCRATES*** Meyrick, 1919
  - ***drosocycla*** Meyrick, 1919

- ***DAVISCARDIA*** **gen. n.**
  - ***coloradella*** (Dietz, 1905) **comb. n.**
  - ***radulella*** **sp. n.**
  - ***bimendella*** (Zeller, 1863) **comb. n.**
  - ***beckeri*** **sp. n.**
  - ***luctuosa*** (Walsingham, 1914) **comb. n.**
  - ***mackiei*** **sp. n.**
  - ***bicolorella*** **sp. n.**
  - sp. A
  - ***lupulella*** **sp. n.**
  - ***hypocritella*** **sp. n.**

- ***SCARDIA*** Treitschke, 1830
  - *Agarica* Sodoffsky, 1837
  - *Fernaldia* Grote, 1881
  - *Duomitella* Koshantschikov, 1923
  - ***anatomella*** (Grote, 1881) **comb. rev.**
    - *fiskeella* Busck, 1908
  - ***assamensis*** **sp. n.**
  - ***amurensis*** Zagulajev, 1965
  - ***alleni*** **sp. n.**
  - ***boletella*** (F., 1794) **nom. rev.**
    - ‡*boleti* (F., 1798) (unjustified emendation)
    - *polypori* (Esper, [1804])
    - *relicta* (Koshantschikov, 1923)
  - ***caucasica*** Zagulajev, 1965

- ***PERILICMETIS*** Meyrick, 1932*b*
  - ***diplaca*** Meyrick, 1932*b*

- ***MOSCARDIA*** **gen. n.**
  - ***renitens*** (Meyrick, 1922*b*) **comb. n.**
  - ***varna*** **sp. n.**

- ***GENTINGIA*** **gen. n.**
  - ***hollowayi*** **sp. n.**

- ***SEMEOLONCHA*** Gozmány, 1968
  - ***penicillata*** Gozmány, 1968

- ***CRANAODES*** Meyrick, 1919
  - ***stereopa*** Meyrick, 1919
  - ***oroya*** **sp. n.**
  - ***sequestrata*** Meyrick, 1926.

- ***PECTINISCARDIA*** **gen. n.**
  - ***prostylias*** (Meyrick, 1927) **comb. n.**

- ***HORMANTRIS*** Meyrick, 1927
  - ***astragalopa*** Meyrick, 1927

- ***CNISMORECTIS*** Meyrick, 1936
  - ***choritica*** Meyrick, 1936

- ***MINISCARDIA*** **gen. n.**
  - ***minimella*** (Busck, 1914) **comb. n.**
  - sp. A

- ***NECROSCARDIA*** **gen. n.**
  - ***funeratella*** (Zeller, 1863) **comb. n.**
  - ***morticina*** **sp. n.**

- ***TINISSA*** Walker, 1864
    - *Polymnestra* Meyrick, 1927
  - ***polystacta*** (Meyrick, 1918)
    - *perilithias* (Meyrick, 1927)
  - ***cultellata*** (Gozmány & Vári, 1973)
  - ***yaloma*** Robinson, 1981
  - ***phrictodes*** Meyrick, 1910
  - ***philippinensis*** Robinson, 1976*a*
  - ***polysema*** Zagulajev, 1972
  - ***albipuncta*** Robinson, 1976*a*
  - ***insignis*** Zagulajev, 1972
  - ***eumetrota*** Meyrick, 1926
  - ***palmodes*** Meyrick, 1917
  - ***convoluta*** Robinson, 1976*a*
  - ***chalcites*** Robinson, 1976*a*
  - ***araucariae*** Robinson, 1976*a*
  - ***amboinensis*** Robinson, 1976*a*
  - ***cinerascens*** Meyrick, 1910
  - ***krakatoa*** Robinson, 1976*a*
  - ***distracta*** Meyrick, 1916
  - ***errantia*** Robinson, 1976*a*
  - ***torvella torvella*** Walker, 1864
  - ***torvella mysorensis*** Robinson, 1976*a*
  - ***classeyi*** Robinson, 1981
  - ***ruwenzorica*** Gozmány, 1966
  - ***spaniastra*** Meyrick, 1932
  - ***poliophasma*** Bradley, 1965
  - ***dohertyi*** Robinson, 1976*a*
  - ***transversella*** (Walker, 1864)
  - ***indica*** Robinson, 1976*a*
  - ***bakeri*** Robinson, 1976*a*
  - ***baliomicta*** Meyrick, 1928
  - ***rigida*** Meyrick, 1910
    - *heterograpta* Meyrick, 1928
    - *chloroplocama* Meyrick, 1938
  - ***parallela*** Robinson, 1976*a*
  - ***goliath*** Robinson, 1976*a*
  - ***kidukaroka*** Robinson, 1976*a*
  - ***insularia*** Robinson, 1976*a*
  - ***chaotica*** Robinson, 1976*a*

- ***SCARDIELLA*** **gen. n.**
  - ***approximatella*** (Dietz, 1905) **comb. n.**

- ***AFROSCARDIA*** **gen. n.**
  - ***capnochalca*** (Meyrick, 1932*b*) **comb. n.**

- ***AMOROPHAGA*** Zagulajev, 1968
  - ***rosemariae*** **sp. n.**
  - ***cryptophori*** (Clarke, 1940) **comb. n.**
  - ***hyrcanica*** Zagulajev, 1968
  - ***japonica*** **sp. n.**

- ***DIATAGA*** Walsingham, 1914
  - ***leptosceles*** Walsingham, 1914
  - ***frustraminis*** **sp. n.**
  - ***brasiliensis*** (Zagulajev, 1966) **comb. n.**
  - ***compsacma*** Meyrick, 1919
  - ***levidensis*** **sp. n.**
  - ***mercennaria*** **sp. n.**
  - ***direpta*** **sp. n.**

- ***MOROPHAGA*** Herrich-Schäffer, 1853
  - *Atabyria* Snellen, 1884
  - *Osphretica* Meyrick, 1910
  - *Microscardia* Amsel, 1952

  - ***bucephala***-group
    - ***cremnarcha*** (Meyrick, 1932*b*) **comb. n.**
      - *nigrocapitella* Petersen, 1959 **syn. n.**
    - ***bucephala*** (Snellen, 1884)
      - *chomatias* (Meyrick, 1910)
      - *rotundata* (Matsumura, 1931)
    - ***soror*** Gozmány, 1965
    - ***vadonella*** (Viette, 1954)

  - ***morellus***-group
    - ***morellus*** (Duponchel, 1838)
      - *fungicolella* Dumont, 1930 **syn. n.**

  - ***sistrata***-group
    - ***borneensis*** **sp. n.**
    - ***sistrata*** (Meyrick, 1916) **comb. n.**

formosana sp. n.
iriomotensis sp. n.

clonodes-group
  clonodes (Meyrick, 1893) **comb. n.**
    porphyrea (Lower, 1903) **syn. n.**
    maculosa (Diakonoff, 1949) **syn. n.**

choragella-group
  choragella ([Denis & Schiffermüller], 1775)
    boleti (F., 1777)
    fungella (Thunberg, 1794)
    mediella (Hübner, 1796)
  hyrcanella Zagulajev, 1966
    talyshensis Zagulajev, 1966

fasciculata sp. n.
kobella sp. n.

Taxa incertae sedis

LEPTOZANCLA Meyrick, 1920
  talaroscia Meyrick, 1920

PHILAGRIAS Meyrick, 1932 **gen. rev.**
  zelotica (Meyrick, 1932) **comb. rev.**

SCARDIA s.l.
  tholerodes Meyrick, 1894
  pharetrodes Meyrick, 1934
  isthmiella Busck, 1914

Taxa excluded from the Scardiinae

Morophaga angulatella Walsingham, 1897: 168. Transferred to *Acrolophus* Poey (Tineidae: Acrolophinae) **comb. n.**

Morophaga hirsutevestita Walsingham, 1897: 167. Transferred to *Acrolophus* Poey (Tineidae: Acrolophinae) **comb. n.**

Scardia conglomerata Meyrick, 1922*a*: 12. Transferred to *Paraclystis* Meyrick (Tineidae: Tineinae) **comb. n.**

Scardia lochaea Meyrick, 1911: 307. Transferred tentatively to *Afrocelestis* Gozmány (Tineidae: Meessiinae) **comb. n.**

Scardia saccharata Meyrick, 1914: 205. Transferred to *Narycia* Stephens s.l. (Psychidae) **comb. n.**

Classification and characters – but phylogeny?

Objectives

The object of this section is to derive a phylogenetic classification of the Scardiinae. Alternatives to the now widely-used 'Hennigian' phylogenetic classifications are those derived by phenetic methods. Arguments for and against different procedures of classification are rife and the reader is referred to the plethora of recent textbooks and papers on the subject for further enlightenment.

It was obvious by inspection that considerable homoplasy occurred within the Scardiinae and within the data matrix compiled for this exercise (Table 1). No 'hand-made' phylogeny could be derived. Techniques for measuring the degree of homoplasy and assessing character 'robustness' were therefore used to pinpoint 'reliable' characters and to clean up the data matrix by removing characters that exhibited high levels of homoplasy. Both phenetic and cladistic methods were employed, to gain familiarity with and to evaluate the techniques, and to contrast the results and assess the degree of consensus between them.

Methods

Character compatibility and homoplasy

The more characters in a matrix of character-scores that are mutually compatible, the more easily may a minimum-length rooted or unrooted tree be resolved. By current convention the minimum-length rooted tree is adopted as the hypothesis of phylogeny of a group. The most parsimonious tree (that with fewest steps) will be shorter and have a greater probability of being unique the greater the degree of character compatibility within the matrix.

Le Quesne (1969; 1972; 1979) has shown the incompatibility of a pair of binary-state characters to involve the presence of all four possible combinations of character-states. This test for incompatibility has become known colloquially as Le Quesne's test. Character incompatibil-

Table 1 Character matrix for Scardiinae: 26 OTUs and 54 characters.

```
DATA MATRIX
TAXON  1 : 111100000100000000011000001000000000000110111100000000 APOMORPHIES: 14
TAXON  2 : 111100000100000000111010001101100001010100000100000000 APOMORPHIES: 17
TAXON  3 : 111100000100000000011010001100000011010100110011000000 APOMORPHIES: 18
TAXON  4 : 111100000100001000111010000000000000000000000000000000 APOMORPHIES: 10
TAXON  5 : 111100001100010000111010000101000000000100110111001000 APOMORPHIES: 20
TAXON  6 : 111100000100010000011010100000000000000000000111001000 APOMORPHIES: 14
TAXON  7 : 111100000100000010111011111000000001010110110110010000 APOMORPHIES: 23
TAXON  8 : 111100001100001000011000110100000001111110100111001000 APOMORPHIES: 23
TAXON  9 : 101011000010000001000000000000100010000001000000000000 APOMORPHIES: 9
TAXON 10 : 100010000001000111101000001000011001110100010111001010 APOMORPHIES: 21
TAXON 11 : 100011000001000111001000001000011001110110110111001010 APOMORPHIES: 23
TAXON 12 : 101011000001001010000001110000000000000001000000000010 APOMORPHIES: 12
TAXON 13 : 110100000001000011001101100100000001111100110111001010 APOMORPHIES: 23
TAXON 14 : 110111000001010011001101100100000001011110110111000010 APOMORPHIES: 25
TAXON 15 : 101000000000100111100000001100000001010110110111101110 APOMORPHIES: 22
TAXON 16 : 000100000000000010100101101000000001011000010010000000 APOMORPHIES: 12
TAXON 17 : 000100000000010010001100100110000001000100000011000000 APOMORPHIES: 12
TAXON 18 : 001100000000010010001100110110000001000110000011000000 APOMORPHIES: 15
TAXON 19 : 001000000000010010110000000000100000000000000000000000 APOMORPHIES: 6
TAXON 20 : 001101000000010001111000001000100000000001000000010000 APOMORPHIES: 12
TAXON 21 : 001000000000010001001000000000100000010110110011000111 APOMORPHIES: 15
TAXON 22 : 000001000010010000100101000100000011000100010111000010 APOMORPHIES: 15
TAXON 23 : 100011000010000011000000001000011001000100010111000010 APOMORPHIES: 16
TAXON 24 : 111111110000010000000000100100010111111110111011110111 APOMORPHIES: 30
TAXON 25 : 101000110000010000000000000000010101111100111011110111 APOMORPHIES: 22
TAXON 26 : 101011000100100011000100100000000101110100110100000110 APOMORPHIES: 20
```

ity (= Le Quesne test failure) is due to homoplasy, itself the result either of character reversal or convergence. Gauld & Mound (1982) have discussed the high frequency of Le Quesne test failure found in data from some insect groups and found it to be concordant with difficulties encountered in classification at generic level in those groups.

Le Quesne's test as conceived originally (1969; 1972) is independent of any definition of character-state polarity; i.e., it is not necessary to define or know which state is the primitive (plesiomorphic) and which the derived (apomorphic) before performing the test. However, a corollary to the test must be that, in cases in which polarity *is* defined, the occurrence of only three of the four possible combinations when the missing fourth combination is that of the two plesiomorphic states (00) must also be grounds for failure (Le Quesne, 1979; Gauld, pers. comm.).

Le Quesne (1972) has described a series of methods for the selection of mutually compatible characters. He has embodied his methods I–IV in a program (for the Commodore 64 microcomputer) and I am most grateful to him for providing this and other programs for use in investigating the properties of the Scardiinae data set. The methods are designed to yield a suite of mutually compatible characters (cliques) by progressive elimination of those characters with the highest frequency of Le Quesne test failure (I), by selection of those characters compatible with that having the lowest rate of failure (II), by selection of those characters compatible with that having the lowest coefficient of character-state randomness (CCSR – see below) (III), and by selection of those characters compatible with that having the lowest value of normal deviate (see Le Quesne, 1972) (IV).

Lack of certainty as to the polarity of certain character-states within the Scardiinae makes it appropriate to adopt in the first instance the uncritical version of Le Quesne's test that assumes unspecified character-polarity. It is this version that is used in Le Quesne's own program. However, combining this test with the more critical test in which failure requires the pairwise comparison to give only the 01, 10 and 11 combinations may point up those characters that are, by comparison with all others, most probably allotted the wrong polarity. Thus in a table of Le Quesne test comparisons (e.g., Gauld & Mound, 1982) failure may be denoted by an 'X', a pass by '—' and failure that is consequent upon a '00' pairing in a hypothetical taxon by a '*'. A character that exhibits a large number of '*'s in the table has probably had the polarity of its constituent states assessed wrongly. Once this check has been made, the version of Le Quesne's test that assumes defined character-polarity is the appropriate one to use.

In addition, therefore, to Le Quesne's program utilizing his clique-indicating methods I–IV, a further program was developed which makes this comparison and draws the table. The program performs two further kinds of tests. The value of P (the probability of Le Quesne test failure by a pair of characters assuming random distribution of the character-states among the species) is calculated using the modified formula of Le Quesne (1979) and used to derive the coefficient of character-state randomness (CCSR) (Le Quesne, 1972). This is the ratio (expressed as a percentage) of the observed frequency of Le Quesne test failure to the expected frequency (from summation of P) – i.e., the proportion of test failures that would occur if the character-states were distributed at random among the species. It is a measure of the 'robustness' of a character. Characters exhibiting little homoplasy have a low CCSR; those with a high level of homoplasy have a high CCSR. This measure may be used to provide a weight for each character: the reciprocal of the observed/expected ratio has been utilized for this purpose in weighted centroid cluster analysis. The program provides also, for each character, a list of the other characters that are compatible with it and with each other: this list of cliques of wholly-compatible characters may be used to find, by inspection, the largest clique or cliques. The method is complementary to Le Quesne's clique-indicating methods I–IV.

The individual test failures of pairs of characters may be examined individually to ascertain those character-scores for particular taxa that contribute most to the overall homoplasy of the data set. Pairs of characters that fail the test are examined in turn: if a single combination of '01', '10' or '11' occurs, the taxon responsible for the single failure-causing score is allocated one 'hit' for each character on a taxa × characters matrix. This procedure is repeated for each character-combination that fails the Le Quesne test. The resulting table resembles the original data matrix but the individual character-scores are replaced by the total 'hits' for which each character-score was responsible. This technique pinpoints, by high numbers of 'hits', wrongly coded data and unique instances of homoplasy. Some falsehoods occur, however; the scores of character-states that occur in only two taxa tend to attract 'hits'. This is because Le Quesne test failure of characters with such a distribution of states must involve each member of the pair of states (say, '1') forming a different combination (thus, '1–0' and '1–1') with the states of the opposed character in order for the test to fail. Both combinations, being unique within the test, attract a 'hit'. Comparison of the sums of the 'hit' scores for the taxa will indicate those taxa in which homoplasy is concentrated.

Clustering and tree-building

Camin-Sokal trees are rooted cladograms constructed on the assumption that a descendent character-state cannot revert to an ancestral character-state – i.e., that homoplasy is always the result of convergence. By contrast, in the construction of a rooted or unrooted Wagner tree either convergence or reversal may be invoked (whichever is the more parsimonious – i.e., requiring fewer steps) to account for the distribution of character-states among taxa (Sneath & Sokal, 1973). Camin-Sokal trees were derived using I. M. White's 'Hennig' program adapted for the Commodore 64. Wagner trees, optimized by branch swapping and the testing of all possible trees for up to nine OTUs, were constructed using a suite of programs written by W. J. Le Quesne. At the very end of the project, Swofford's sophisticated mainframe program 'PAUP' was utilized, employing options for multiple parsimony and optimization by global branch-swapping.

Five methods of cluster analysis have been used to generate dendrograms as alternatives to cladistic analysis using Wagner and Camin-Sokal techniques. Three of these methods utilized a common matrix of Gower similarity coefficients to yield dendrograms by, respectively, single-link, complete link and average-link cluster-analysis. Analysis was performed using programs provided by W. J. Le Quesne. The fourth and fifth methods were, respectively, weighted and unweighted centroid cluster analysis using the technique described by Robinson (1975) but modified for binary-state data. Characters were each weighted by the reciprocal of their ratio of observed to expected Le Quesne test failure as described above.

Supraspecific groups (OTUs) classified

Twenty-six groups (OTUs) were subjected to numerical analysis. Twenty-one of these are groups represented in the subsequent taxonomic treatment as either genera or species-groups: the remaining five OTUs are the two species of *Moscardia*, *Morophaga borneensis*, and the Old World and New World species of *Morophagoides*. Each taxon was allocated an identifying number, as follows.

1: *Morophaga bucephala*-group
2: *Morophaga borneensis*
3: *Morophaga morellus*-group (monobasic)
4: *Morophaga choragella*-group
5: *Morophaga sistrata*-group
6: *Morophaga clonodes*-group (monobasic)
7: *Amorophaga*
8: *Diataga*
9: *Miniscardia*
10: *Moscardia renitens*
11: *Moscardia varna*
12: *Necroscardia*
13: *Scardia*
14: *Daviscardia*
15: *Cranaodes*
16: *Montescardia*
17: *Morophagoides* (old World species)
18: *Morophagoides* (new World species)
19: *Scardiella* (monobasic)
20: *Afroscardia* (monobasic)
21: *Pectiniscardia* (monobasic)
22: *Bythocrates* (monobasic)
23: *Perilicmetis* (monobasic)
24: *Cnismorectis* (monobasic)
25: *Hormantris* (monobasic)
26: *Gentingia* (monobasic)

The identifying number for each taxon is the same throughout all analyses and is that used in Table 1. *Semeoloncha* has been omitted from phenetic and cladistic assessment. The two specimens are in poor condition and, in both, most of the abdomen has been discarded during the preparation of the genitalia slide. As a result, the set of character scores for *Semeoloncha* is so incomplete as to render analysis impossible. *Tinissa* has also been omitted: a cladistic classification of this undoubtedly monophyletic group has already been proposed (Robinson, 1981) and the marked homoplasy within the genus makes its scoring particularly difficult. It is placed here as the sister-group of *Necroscardia*, sharing with that genus an extraordinarily modified juxta (Robinson, 1976*a*; 1981).

Characters used in classification

Extraordinary conservatism in the external structure of Scardiinae contrasts sharply with the morphological diversity of the genitalia which is just as remarkable as that described previously for *Tinissa* (Robinson, 1976*a*). Characters were selected for inclusion that were stable within genera or species-groups defined on the basis of close similarity in genital structure. Two distinct groups of characters were used. The first group (characters 1–30; 50–54) includes 'conventional' characters of the head, legs, wings and genitalia (including modification of the terminal abdominal segment). Genital characters were restricted to those of males (with the exception of 29, a synapomorphy of all *Morophagoides* species) as the inclusion of characters of the female genitalia would have reduced substantially the number of taxa upon which analyses could be performed. Thirty-five binary-state 'conventional' characters were selected for inclusion in the analyses.

In addition to the thirty-five 'conventional' characters, it was found that the number and disposition of sensory setae on the ventral surface of the abdomen, visible under phase contrast at a magnification of ×150 or ×250, provided a second group of 'unconventional' characters that were of use in classification at generic and subgeneric level. Accordingly, a further 19 binary-state characters (31–49) were added to the matrix of character-scores (Table 1).

The arrangement of setae on the abdominal sternites follows a basic plan. A cluster of setae (more than 30 in most Scardiinae) occupies a medial position close to the posterior margin of sternite 2. Sternites 3 to 7 each carry a pair of widely separated setae close to the anterior margin. The region between these 'fixed' setae may, in some taxa, contain an arc of irregularly-placed accessory setae: their presence or absence and their concentration (although not their precise number) on a particular sternite appears to be reasonably consistent at species-group level.

Accessory setae are present on sternite 7 in all Scardiinae. Sternite 8 does not possess the 'fixed' pair in all taxa but, in most taxa, accessory setae are present, scattered close to the anterior margin. *Amorophaga* does not possess the 'fixed pair' and only a single pair of accessory setae is present. These, from their position, do not represent the 'fixed pair'.

Setae are frequently lost during the process of cleaning the abdomen. However, the sockets of sensory setae are easily distinguished from the surrounding scale-bases when viewed under phase-contrast and can be counted.

Character-polarities were estimated initially by outgroup comparison with other subfamilies of Tineidae, notably the Nemapogoninae, Myrmecozelinae (including *Hapsifera*), Tineinae and Hieroxestinae. Inappropriate comparisons or those yielding ambiguous results were reinforced by in-group comparisons in the light of preliminary classifications made using phenetic and Camin-Sokal methods. Further refinements to polarity estimation were made in the light of character-compatibility analysis using Le Quesne's test and its derivatives.

In the absence of detailed information from other groups, the polarities of setal characters are inevitably tentative.

The characters used in classification are as follows. The presumed apomorphic state is described first, and the plesiomorphic state second. Some comments on the characters, their variation, occurrence, and significance are included. A measure of the homoplasy of each character (the coefficient of character-state randomness – CCSR) is given. The 14 characters that survive one or more of Le Quesne's elimination procedures (Le Quesne, 1972) are indicated.

1: Antenna of male lacking cilia from the dorsal surface/cilia developed on the whole circumference of each flagellar segment. The states of this character are clear-cut and the arrangement of cilia is easily visible under low magnification if the specimen is rotated along the axis of the flagellum. CCSR = 68%.

2: Antenna of male lacking scales on the ventral surface of the flagellum/complete circumference of each flagellar segment scaled. The states of this character are not as clear-cut as those of the preceding character, nor as easy to observe. Some loss of scales seems to occur naturally in worn specimens; however, the apomorphic state of this character is usually recognizable as at least a narrow bare line on the undersurface of the flagellum. In some groups it is very obvious, and in *Scardia* the bare ventral area accommodates a distinct swelling of each segment (see Zagulajev, 1973: figs 5, 6). CCSR = 81%.

3: Antennal cilia of male longer than 1·5× the flagellar diameter/cilia shorter than 1·5× the flagellar diameter. In practice, this division is realistic although occasional 'borderline cases' have been noted at individual level. Both states have, however, been noted in different species of *Daviscardia*: the plesiomorphic state has been entered in the data matrix for that genus. CCSR = 68%. Survives Le Quesne elimination procedure 4.

4: Antennal pecten with more than 15 bristles/pecten with fewer than 15 bristles. This character has been discussed previously with respect to *Tinissa* (Robinson, 1981). The difference between the typical tineid pecten with sparse and slender bristles and the apomorphic 'brush' of sometimes more than 40 flattened bristles present in some Scardiinae is obvious in fresh specimens. However, the pecten is subject to rapid attrition during life and the confirmation of the plesiomorphic state usually requires preparation of the antenna for microscopic examination in transmitted light. Pectens with large numbers of bristles do occur in a few other scattered genera in the Tineidae. For example, *Dasyses* (Hapsiferinae) has a pecten of about 30 filamentous bristles but these are so thin that the pecten never appears brush-like as in the Scardiinae. CCSR = 85%.

5: Interocular index greater than 1·0/interocular index equal to or less than 1·0. This index is the vertical diameter of the eye divided by the interocular distance as measured at about the level of the tentorial pits. Although the measurement is best made on a microscopic preparation of the head, the paucity of specimens of most groups necessitated its being taken from pinned specimens in this study. The range observed in the Scardiinae is narrow – from about 0·7 to 1·3 –

and continuous; it is unlikely that this character is of value for classification in this group. CCSR = 92%.

6: Maxillary palpus with fewer than five segments (usually three, occasionally four segments: palpus usually short, only reaching the base of the second segment of the labial palpus/maxillary palpus 5-segmented (usually elongate, reaching the apex of the second segment of the labial palpus). Resolution of the segmentation of the maxillary palpus is difficult without preparation of the head for examination in transmitted light. This has not been possible for many groups and the character-scores given here should be treated with some caution. Only a single example of an elongate three-segmented palpus has been noted – in one species of *Daviscardia*; however, in *Montescardia* the maxillary palpus, although five-segmented, is as short as in most groups with a three-segmented palpus (Zagulajev, 1973: fig. 4). CCSR = 93%.

7: Pilifers absent/pilifers present. CCSR = 23%. Survives Le Quesne elimination procedures 1–4.

8: Second segment of labial palpus exceptionally slender and elongate, longer than width of head/second segment shorter than width of head (see 54). CCSR = 23%. Survives Le Quesne elimination procedures 1–4.

9: Outer mid-tibial spur and outer proximal hind tibial spur short, less than 0·4 the length of the corresponding inner spur/outer spurs of normal length, about 0·5–0·7 the length of the inner spurs. While consistent and conspicuous, the significance of this character is uncertain. Short spurs are found in *Diataga*, the *Morophaga sistrata*-group and in *Morophaga fasciculata*. CCSR = 37%. Survives Le Quesne elimination procedure 2.

10: Forewing veins R_3 and R_4 fused, stalked or approximated at base (connate)/R_3 and R_4 separate. This character is subject to some intraspecific variation and both stalking and basal approximation of the two veins may occur in the same species. However, fusion is a rare individual variation. CCSR = 73%.

11: Forewing veins M_3 and CuA_1 stalked or approximated at base (connate)/M_3 and CuA_1 separate. Some individual variation occurs in this character: fusion has not been noted. The stalking of M_2 and M_3 is an autapomorphy of *Diataga*. CCSR = 58%.

12: Forewing pattern composed of dark purple-brown ground-colour with contrasting whitish terminal and posterior fasciae (continuous in many taxa)/forewing pattern irrorate and cryptic, resembling moss or speckled tree-bark, or otherwise modified. The state of this character has been scored as apomorphic for *Moscardia renitens* but is uncertain in this species as the only known specimen is very worn. Several of the New World species of *Morophagoides* and *Cranaodes oroya* have wing-patterns that approach the apomorphic state of this character but these are considered to be cases of convergence. CCSR = 71%.

13: Forewing pattern composed of light greenish bronze ground-colour with bold purple-brown marginal spots/forewing pattern irrorate and cryptic, resembling moss or speckled tree-bark, or otherwise modified (see 12). The apomorphic state of this character is shared by *Semeoloncha* as well as *Cranaodes* (highly modified in *oroya*) and *Gentingia*. The somewhat similar, strongly-marked pattern of certain species of *Morophagoides* (notably *iulina*) is considered to be a convergent development: it is not strictly comparable as the dark blotches are not at or arising from the wing margin. CCSR = 45%. Survives Le Quesne elimination procedures 1–4.

14: Coremata absent from eighth abdominal segment/pair of lateral coremata present in eighth abdominal segment. This character was found to be highly unstable in *Tinissa* (Robinson, 1981) and a similar high level of homoplasy seems to occur in the remainder of the Scardiinae. CCSR = 87%.

15: Pair of elongate and tubular apodemes arising from sides of eighth sternite and associated with coremata/eighth sternite without apodemes or with flap-like apodemes arising from posterior corners. CCSR = 73%.

16: Pair of short, flap-like apodemes arising from posterior corners of eighth sternite and associated with coremata/eighth sternite without apodemes or with elongate rod-like apodemes arising from sides. The apomorphic state of this character is expressed in *Semeoloncha* (not included in analyses) as well as in both species of *Moscardia* and in *Cranaodes*. CCSR = 38%.

17: Uncus complex, modified usually by strong sclerotization and the development of spines or more elaborate processes/uncus simple, a pair of soft and setose lobes. CCSR = 79%.

18: Uncus lobes fused with tegumen/uncus lobes separated from tegumen by at least a narrow and recognizable line of flexion. CCSR = 80%.

19: Tegumen broken mid-dorsally by at least a narrow membranous suture-line/tegumen fused dorsally and thus complete. CCSR = 90%.

20: Valva with setose lobe arising from internal membrane close to base of costa and frequently associated (most markedly in *Diataga*) with a strongly developed transtilla/valva lacking basal setose lobe. The occurrence of an internal lobe in *Scardiella* and *Afroscardia* is considered to be a convergent development unrelated to the occurrence of a similar lobe in *Morophaga*, *Diataga* and *Amorophaga*. CCSR = 64%. Survives Le Quesne elimination procedures 1, 2 and 4.

21: Valva with ventroapical processes (or with apex modified) forming a functional hook/apex of valva smoothly rounded and/or incapable of use as a hook. CCSR = 84%.

22: Valvae fused ventrally to form a single movable complex/valvae separate, each capable of at least some independent movement. In the case of, for example, *Scardia*, fusion of the valvae involves also the juxta which is interposed between them: cases such as this have been interpreted as being the apomorphic state of the character. CCSR = 72%.

23: Valva with deep longitudinal cleft effectively dividing valva into dorsal and ventral arms/valva entire. The apomorphic state of this character is distinctive. It occurs in all species of *Amorophaga*, and in all species of *Morophaga* except the *bucephala*-group; however, the cleft is ill-defined and shallow in *Morophaga morella*. The emarginate dorsoapical region of the valva in the *bucephala*-group may in fact be a very shallow cleft but has not been scored as such. CCSR = 49%. Survives Le Quesne elimination procedures 1, 3 and 4.

24: Saccus broad, wider than long/saccus elongate, longer than wide. CCSR = 80%.

25: Juxta complex, bearing or forming processes, in some groups partially fused with and forming a functional part of the valvae, or apparently entirely fused with the valvae (e.g., some species of *Daviscardia*)/juxta simple, an ovate and usually ill-defined sclerite on the ventral surface of the anellus. CCSR = 89%.

26: Juxta divided medially into two arms or lobes/juxta entire. CCSR = 82%.

27: Vesica lacking spicular cornuti/vesica with spicular cornuti. Spicular cornuti are conspicuously developed in *Daviscardia*. In some other groups they are very small and sparse and should not be confused with the microtrichia lining the ductus ejaculatorius of all Tineidae. In some taxa the cornuti are minute, resembling microtrichia and probably of similar structure. There is, however, a clear demarcation between the vesica and the ductus ejaculatorius in all specimens examined. CCSR = 86%.

28: Aedeagus smooth-surfaced/aedeagus with spinose carinae. The homology of, for example, the minute spicular carinae of *Daviscardia luctuosa* with the comparatively enormous carinae of *Moscardia* is uncertain. CCSR = 91%.

29: Female with pair of strong pocket-shaped signa in bursa copulatrix/bursa copulatrix either without signa or signa not of this form. The apomorphic state of this character is a synapomorphy of all *Morophagoides* species. CCSR = 8%. Survives Le Quesne elimination procedures 1–4.

30: Apices of otherwise simple pair of uncus lobes fused together and tapered to form a minute hook/apices of uncus lobes not so modified. The apomorphic state of this character is a synapomorphy for the *Morophaga sistrata*-group. CCSR = 31%. Survives Le Quesne elimination procedures 1, 3 and 4.

31: Medial group of setae on sternite 2 with fewer than 15 pairs/medial group with more than 15 pairs of setae. CCSR = 71%.

32: Longitudinal line of microtrichia present, running through medial group of setae on sternite 2/microtrichia absent. CCSR = 66%.

33: Microtrichia minute, requiring magnification of ×600 and phase-contrast for definition/microtrichia comparatively large, visible at ×150. CCSR = 28%. Survives Le Quesne elimination procedures 1–4.

34: Medial group of setae broad, scattered across more than 0·4 width of sternite/medial group compact, less than 0·4 width of sternite. CCSR = 58%.
35: Medial group with isolated outlying pair of setae/medial group uniformly spaced. CCSR = 98%.
36: Sternite 3 with accessory setae present/accessory setae absent. CCSR = 79%.
37: Sternite 3 with more than 4 pairs of accessory setae/fewer than 4 pairs of accessory setae. CCSR = 82%.
38: Sternite 4 with accessory setae present/accessory setae absent. CCSR = 77%.
39: Sternite 4 with 3 or more pairs of accessory setae/fewer than 3 pairs of accessory setae. CCSR = 82%.
40: Sternite 5 with accessory setae present/accessory setae absent. CCSR = 70%.
41: Sternite 5 with 3 or more pairs of accessory setae/fewer than 3 pairs of accessory setae. CCSR = 97%.
42: Sternite 6 with accessory setae absent/with accessory setae present. CCSR = 51%. Survives Le Quesne elimination procedure 3.
43: Sternite 6 with 3 or more pairs of accessory setae/fewer than 3 pairs of accessory setae. CCSR = 77%.
44: Sternite 7 with 3 or more pairs of accessory setae/fewer than 3 pairs of accessory setae. CCSR = 76%.
45: Sternite 7 with 10 or more pairs of accessory setae/with fewer than 10 accessory setae. CCSR = 68%
46: Sternite 8 lacking 'fixed pair' of setae/'fixed pair' present. CCSR = 81%.
47: Sternite 8 with accessory setae present/accessory setae absent. CCSR = 80%.
48: Sternite 8 with more than one pair of accessory setae/one pair or no accessory setae present. CCSR = 80%.
49: Sternite 8 with 10 or more pairs of accessory setae/with fewer than 10 pairs of accessory setae. CCSR = 61%.
50: Sockets of ventral abdominal scales scattered randomly/sockets arranged in irregular transverse pattern. CCSR = 91%.
51: Sockets of ventral abdominal scales arranged in regular and strongly linear transverse pattern/sockets arranged in irregular transverse pattern. CCSR = 74%.
52: Ground-colour of forewing gold or pale bronze/ground-colour not thus, usually cream or off-white (but dark brown in *Afroscardia*). CCSR = 64%. Survives Le Quesne elimination procedures 1–4.
53: Scales of second segment of labial palpus short, giving the segment a cylindrical appearance/scales elongate, particularly distally, giving the segment a triangular appearance in lateral view. CCSR = 71%. Survives Le Quesne elimination procedures 1 and 2.
54: Labial palpus slender, longer than 0·9 the width of the head/labial palpus shorter and stouter, of typical tineid length. The apomorphic state of this character is expressed by *Cnismorectis*, *Hormantris* and *Pectiniscardia* but is not as pronounced in the latter species as in the other two. The extreme length of the palpus shared by these two is scored as character 8. CCSR = 51%. Survives Le Quesne elimination procedures 1–4.

Results

Investigation of homoplasy

Of the 2862 possible combinations of pairs of characters in the data set for the Scardiinae (Table 1), 1772 (61·9%) fail the critical version of Le Quesne's test. The number of test failures expected if scores were randomly distributed is 2495 and the overall coefficient of character-state randomness is thus 71%, indicating overall a high degree of homoplasy. Homoplasy appears to be spread throughout the data: only 14 of the 54 characters survived one or more of Le Quesne's elimination procedures (see above). Cliques of entirely compatible characters are smaller: two cliques of 10 characters, five cliques of nine, and larger numbers of smaller cliques were found. The seven largest cliques include 25 different characters. Only one of the characters that survived Le Quesne's elimination procedures (23) is not included among them. These cliques of characters are too small to provide an adequate classification.

Only three characters exhibited Le Quesne test failures consequent upon a '00' pairing in a hypothetical taxon. These were characters 3 (two occurrences), 36 and 47 (one occurrence each).

'Hits' of particular scores for particular OTUs were not markedly concentrated in particular characters: totalled hits per character ranged from six (characters 3 and 29) to 37 (character 35), 43 characters attracting between 10 and 24 hits. The distribution of total hits among OTUs was much more erratic, however, ranging from two (OTU 14) to 110 (OTU 24). Five OTUs attracted 72 or more hits: these were *Diataga*, *Necroscardia*, *Cranaodes*, *Cnismorectis* and *Gentingia*. The remaining OTUs attracted 58 or fewer hits, seven attracting 10 or less. This observation suggests that certain OTUs may be 'reservoirs of homoplasy' and that their position within a classification should be treated with appropriate caution.

Nineteen individual character-scores (all apomorphic occurrences) attracted 10 or more hits. These were: OTU 1 – character 45; OTU 2 – character 30; OTU 5 – characters 9 and 30; OTU 8 – characters 9 and 15; OTU 9 – character 11; OTU 12 – characters 12, 15 and 26; OTU 15 – characters 13, 16 and 49; OTU 20 – character 50; OTU 21 – character 54; OTU 24 – character 35; OTU 26 – characters 10, 13 and 34. Characters 9, 13 and 30 have only a pair of apomorphic occurrences among the OTUs and their attraction of large numbers of hits may be artefactual (see above) or might suggest that the occurrences are the result of convergence. The latter explanation is unconvincing in the case of character 30 (the fusion and hooking of the apex of the uncus in the *Morophaga sistrata*-group and *M. borneensis*). However, the majority of the remaining scores attracting high numbers of hits would, by inspection and in the light of subsequent analyses, appear to be genuine instances of homoplasy.

The degree of homoplasy of the data set of the Scardiinae is such that attempts to define cliques of compatible characters, 'refine' the data set by removal of characters with high CCSRs or by deletion of obvious convergent occurrences of apomorphic scores resulted either in almost complete deletion of the matrix or in little improvement in the overall level of homoplasy. Accordingly, trees were prepared from the data set in Table 1 without modification, using the techniques described above.

Cladistic classification

The shortest cladogram found using a Camin-Sokal technique (no reversals permitted) involved 217 character-steps (Fig. 1); the shortest trees found originally using a Wagner method (convergence and reversal permitted) on a microcomputer involved 199 steps (Figs 2, 3). More sophisticated subsequent analysis using Swofford's PAUP program gave eight trees (rooted to an all-zero 'ancestor') of closely similar topology, each of 198 steps. The first tree is illustrated in Fig. 3a: the consensus tree of all eight variants is indicated by the dashed lines. Character changes on all branches are indicated; reversals (character-state changes from '1' to '0') are indicated by an asterisk. Topological variation within the eight 198-step trees involves interchange of *Morophaga borneensis* and *M. morellus*, interchange of *Morophagoides* and *Montescardia*, and interchange of four groups: *Scardia* + *Daviscardia*, *Gentingia*, *Moscardia* + *Perilicmetis*, and *Cnismorectis* + *Hormantris* + *Pectiniscardia* + *Cranaodes*.

The topology of the right-hand halves of the 199- and 198-step trees is the same. However, the sequencing of the left-hand halves differs considerably. The Camin-Sokal tree (Fig. 1) differs further from the 199- and 198-step optimized Wagner trees (Figs 2, 3, 3a). However, the species-groups of *Morophaga*, plus *Diataga* and *Amorophaga* together form a monophyletic group as they do in the Wagner trees (although interrelationships *within* the group differ). The two *Moscardia* species, *Scardia* + *Daviscardia*, *Cnismorectis* + *Hormantris* + *Pectiniscardia*, *Miniscardia* + *Necroscardia* and the two groups of *Morophagoides* species also form monophyletic groups as in the optimized Wagner trees. However, the sequence of branching to these groups is quite different in the Camin-Sokal tree.

The 198-step trees found by PAUP involve only seven uniquely derived characters (out of a

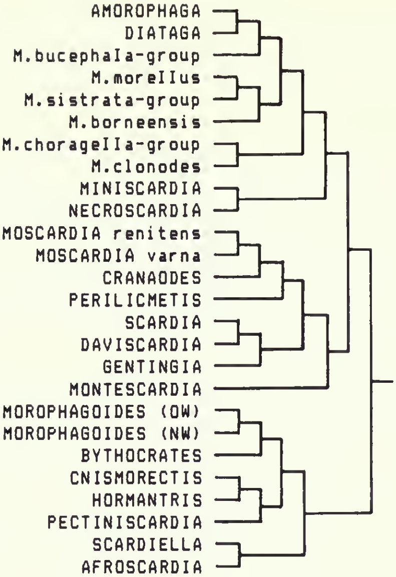

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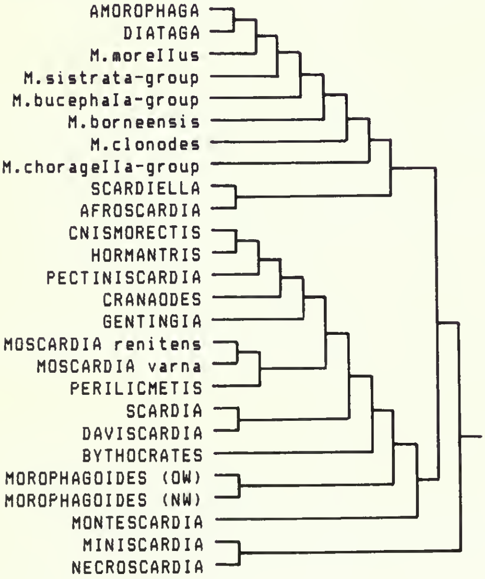
Fig. 1 Classification of Scardiinae by Camin-Sokal technique. This was the shortest tree found with 21 steps.



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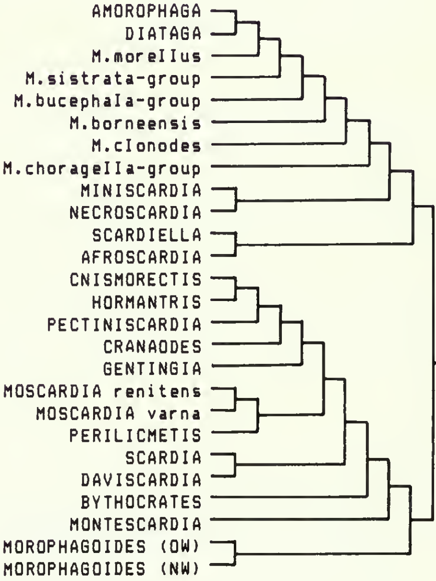

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Figs 2, 3 Classification of Scardiinae by Wagner technique. Three alternative 199-step trees were found the third a variant of that in Fig. 3 with the *Miniscardia* + *Necroscardia* and *Scardiella* + *Afroscardi* branches transposed.

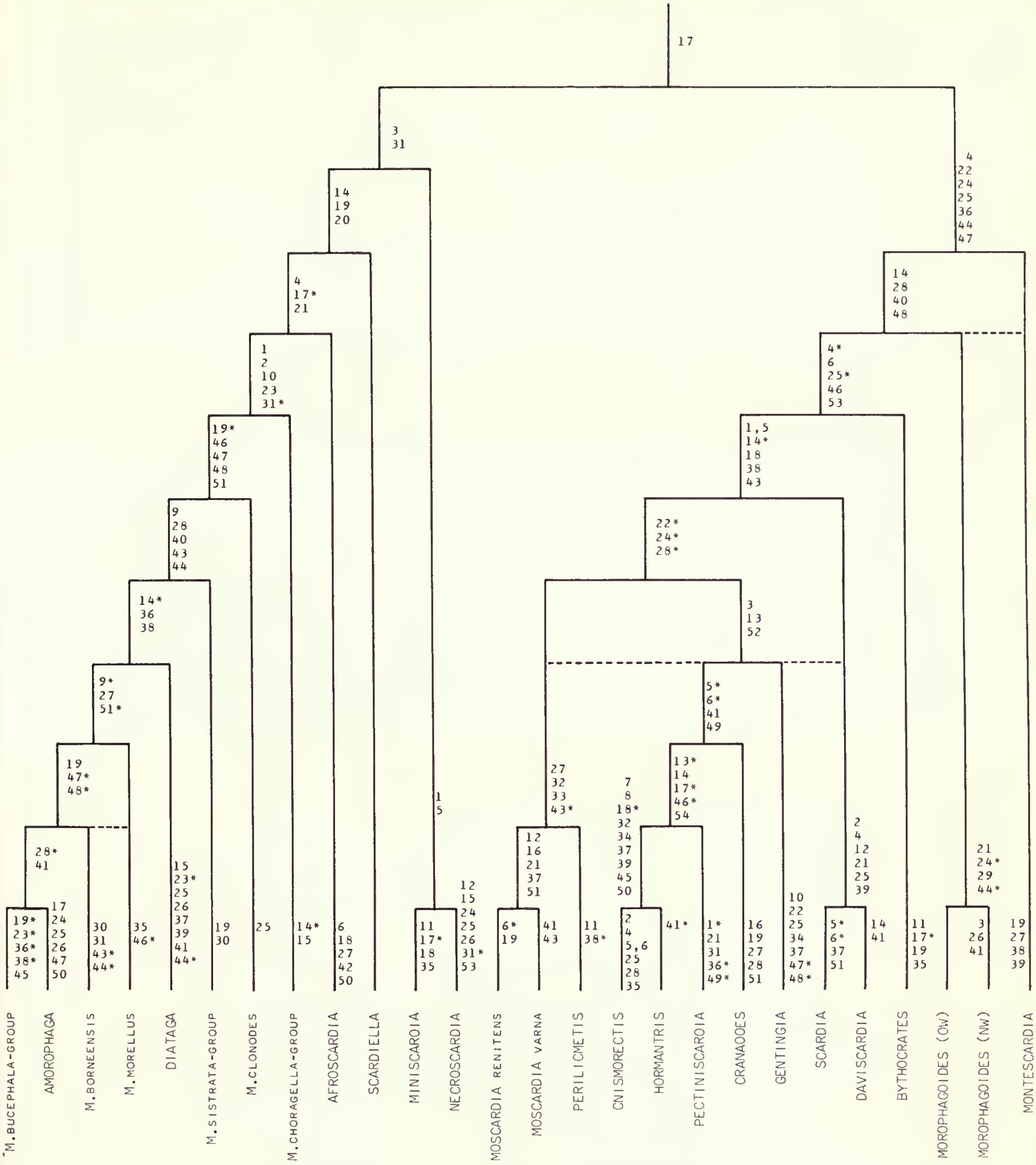

Fig. 3a Classification of Scardiinae by optimized Wagner tree generated by PAUP. The consensus tree for the eight 198-step trees obtained is indicated by dashed lines. Character changes on each branch are indicated; reversals are signified by an asterisk. There are no autapomorphic changes for *Scardiella* or *Morophagoides* (Old World spp.).

potential maximum clique of 10). These are 7, 8, 20, 29, 33, 52 and 54. All these were correctly predicted by Le Quesne elimination procedures. Characters 7 and 8 are synapomorphies of *Cnismorectis* and *Hormantris*; 20 (presence of valval lobe) is a synapomorphy of *Morophaga, Diataga, Amorophaga, Afroscardia* and *Scardiella*)but the lobe in the latter two genera may not be homologous with that in the others – see above); 29 is a synapomorphy of *Morophagoides* species, 33 a synapomorphy of *Moscardia* + *Perilicmetis*; 52 is a synapomorphy of the branch *Cnismorectis* – *Gentingia* and 54 a synapomorphy of the group *Cnismorectis* + *Hormantris* + *Pectiniscardia*. Thirteen of the 19 character-scores that attracted 10 or more 'hits' (see above) are explained as single convergent occurrences in individual taxa. The remaining six involve changes to characters 9, 13 and 54. Character 54 is uniquely derived in the PAUP tree. Character 9 occurs in its apomorphic state in *Diataga* and the *Morophaga sistrata*-group; 13 occurs in its apomorphic state in *Cranaodes* and *Gentingia* and is accounted for in the PAUP analysis by a 'switch on – switch off' sequence as is character 9.

Characters undergo up to nine changes (characters 19 and 25) in the PAUP tree. The number of characters undergoing two to nine changes is, respectively, 11, 9, 8, 12, 3, 2 and 2. Characters surviving Le Quesne elimination procedures appear to be 'robust' on the PAUP tree. Seven of the 14 are uniquely derived (see above; characters 9, 13 and 23 are derived only once but undergo reversal once (9, 13) or twice (23). Characters 30, 42 and 53 are derived twice while character 3 is derived three times.

Phenetic classification

Trees were derived using single-link, complete-link and average-link cluster analysis (Figs 4, 5, 6) and by unweighted and weighted centroid cluster analysis (Figs 7, 8). Single-link clustering (Fig. 4) recovers the left half of the optimized Wagner tree produced by PAUP (Fig. 3a) as a discrete cluster but the sequence of linkage of its component OTUs is quite different. The groups *Moscardia* + *Perilicmetis*, *Cnismorectis* + *Hormantris*, *Morophagoides*, and *Scardia* + *Daviscardia* are also recovered. Complete-link clustering (Fig. 5) recovers *Morophaga* + *Diataga* + *Amorophaga* as a single cluster along with *Miniscardia* + *Necroscardia*, *Moscardia* + *Perilicmetis*, *Scardia* + *Daviscardia*, *Morophagoides*, and *Cnismorectis* + *Hormantris*. Average-link clustering (Fig. 6) additionally clusters *Pectiniscardia* with *Cnismorectis* + *Hormantris*. Centroid cluster analysis (Fig. 7) recovers only *Moscardia*, *Scardia* + *Daviscardia*, *Morophagoides*, and *Cnismorectis* + *Hormantris*: the technique is highly discriminatory and the result is somewhat at

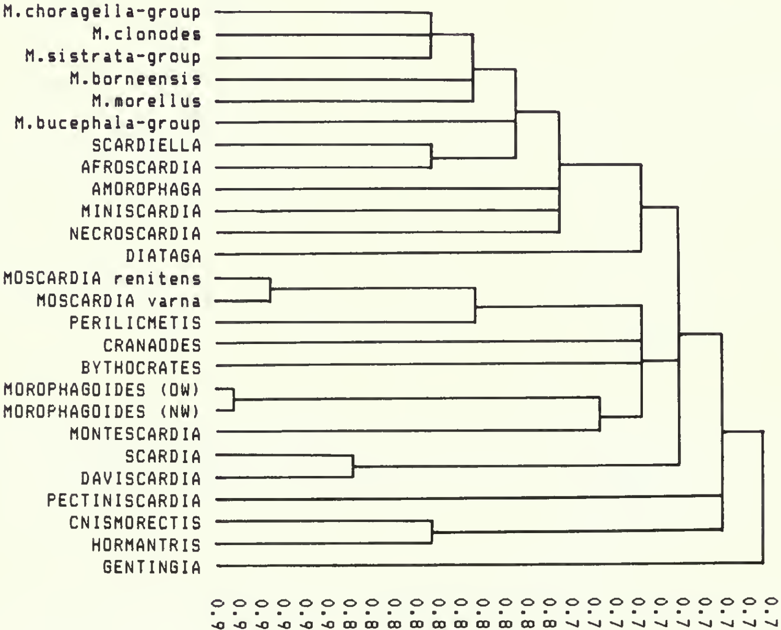

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Fig. 4 Classification of Scardiinae by single-link cluster analysis.

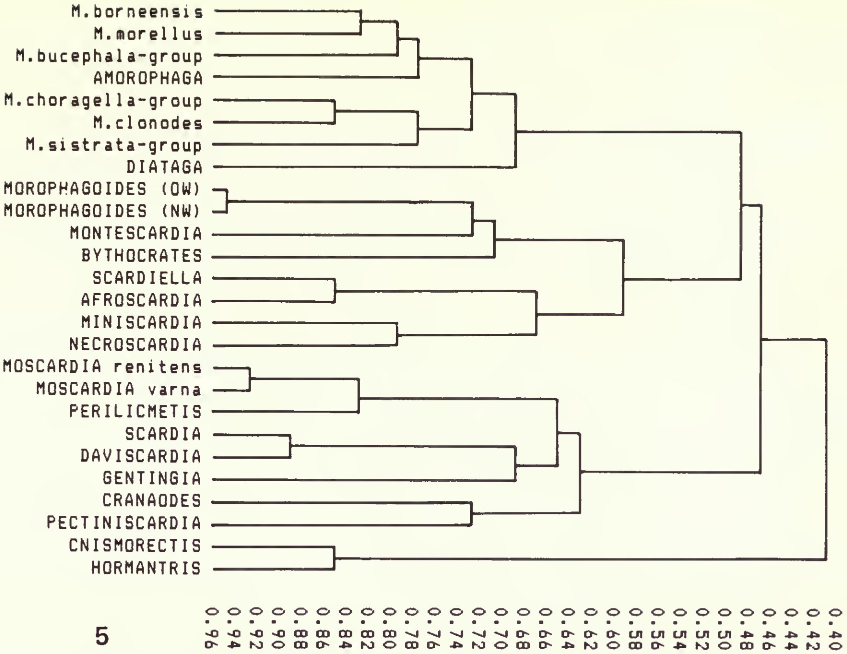

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Fig. 5 Classification of Scardiinae by complete-link cluster analysis.

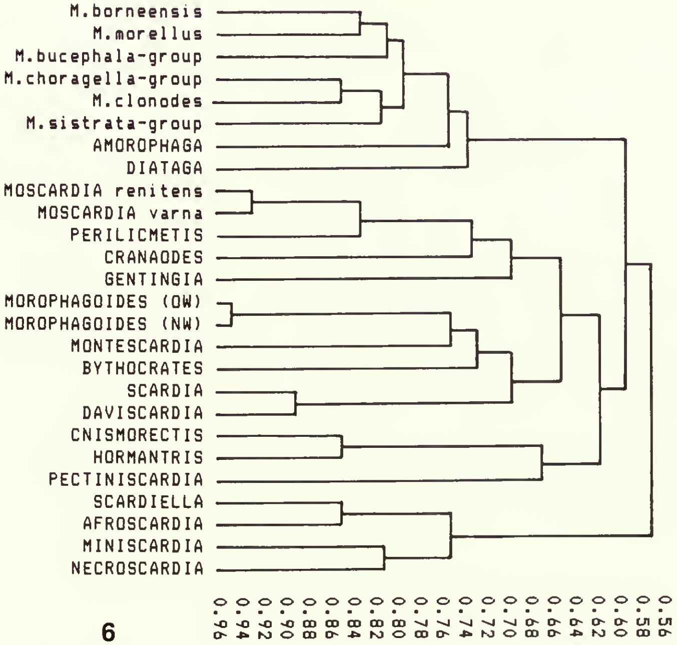

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Fig. 6 Classification of Scardiinae by average-link cluster analysis.

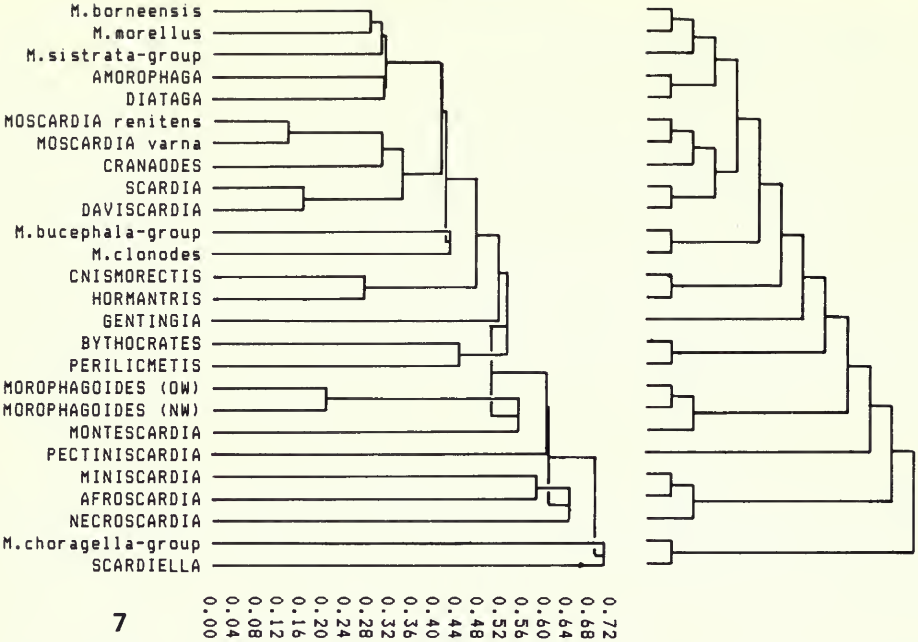

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Fig. 7 Classification of Scardiinae by unweighted centroid cluster analysis: the linkage sequence is clarified on the right.

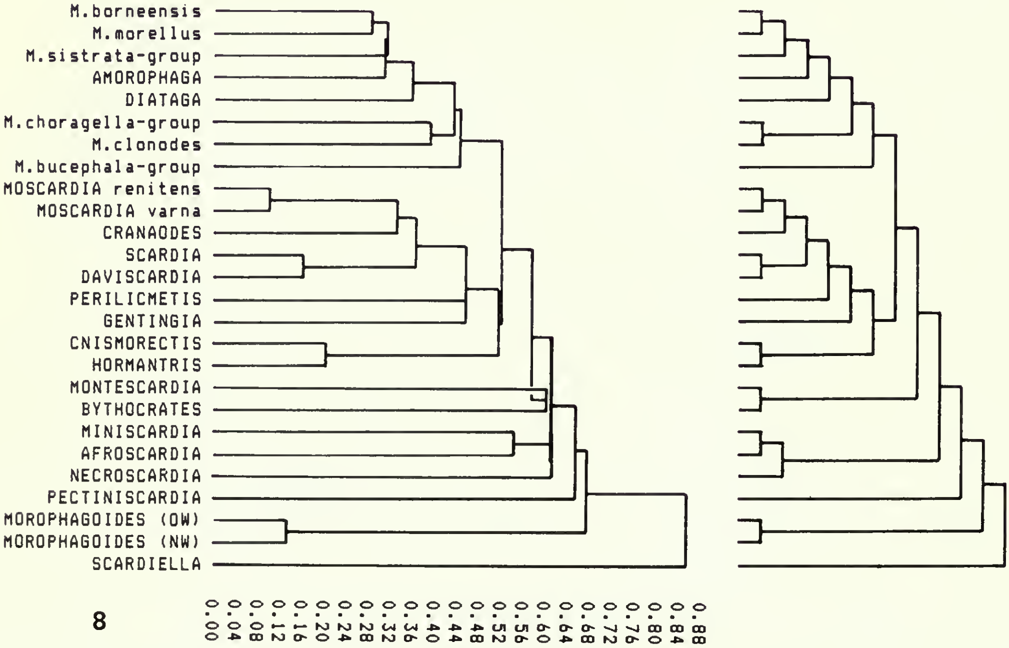

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Fig. 8 Classification of Scardiinae by weighted centroid cluster analysis: the linkage sequence is clarified on the right.

variance with those obtained using other methods. Weighting the characters in centroid analysis (Fig. 8) permits recovery of a further group found by other methods – *Morophaga* + *Amorphaga* + *Diataga*.

Within *Morophaga, Diataga* and *Amorophaga*, certain OTUs are grouped consistently by the various phenetic methods. The *Morophaga choragella*-group and *M. clonodes* are paired by four of five methods; *M. borneensis* is paired with *M. morellus* by four of five methods. The *M. sistrata*-group is paired with the *M. choragella*-group + *M. clonodes* by three of five methods. None of these groups is supported by the PAUP tree but the Camin-Sokal tree also pairs the *M. choragella*-group and *M. clonodes*.

Classification adopted

The classification of the Scardiinae adopted here is a modified version of the 198-step tree shown in Fig. 3a. *Tinissa* is placed tentatively as the sister-group of *Necroscardia*, and *Semeoloncha* as the sister-group of *Cranaodes*. For the purposes of the present paper, *Amorophaga* and *Diataga* have been retained as separate genera, but it is probable that *Morophaga* is paraphyletic with respect to both. *Morophaga borneensis* is considered to be a member of the *M. sistrata*-group, sharing character 30 which is considered to be uniquely derived. Relationships of *Amorophaga*, *Diataga* and the species-groups within *Morophaga* are debatable; drastic rearrangement of the tree is possible with very little increase in the number of character-steps involved. The sequence adopted here for *Amorophaga*, *Diataga* and the species-groups of *Morophaga* is therefore arbitrary.

The integrity of *Morophaga* + *Diataga* + *Amorophaga* is supported by all methods except single-link and unweighted centroid cluster analysis. This group appears to be genuinely monophyletic, defined by the derivation of characters 1, 2, 10 and 23 and the reversal of 31 in the PAUP tree: character 20 (basal lobe of valva) also supports the monophyly of the group if the occurrence of valval lobes of rather different type in *Afroscardia* and *Scardiella* is ignored (see above). Characters 20 and 23 (modified interpretation) are uniquely derived but 23 undergoes reversal twice. Characters 1 and 2 are derived three times, character 10 twice (it is otherwise an autapomorphy of *Gentingia*).

All analyses except single-link and centroid clustering support the sister-group relationship of *Miniscardia* and *Necroscardia* but the two groups are united only by the convergent derivation of characters 1 and 5 in the PAUP tree. Both characters occur twice elsewhere.

The sister-group relationship of the two *Moscardia* species is supported by all analyses: five character changes are involved but these all occur also elsewhere. The sister-group relationship of *Perilicmetis* to *Moscardia* is supported by cladistic and most phenetic analyses. The four character changes involved include one uniquely derived character (33). The grouping is further supported by character 32 which, however, occurs also in *Cnismorectis* and *Hormantris*.

Scardia and *Daviscardia* are paired by all analyses. On the PAUP tree their relationship is supported by changes to characters 2, 4, 12, 21, 25 and 39. Each of these is very homoplasious with a minimum of three independent apomorphic occurrences.

The sister-group relationship of *Cnismorectis* and *Hormantris*, supported by all analyses, involves derivation of eight characters and reversal of one. Two of the characters (7, 8) are uniquely derived and three more (32, 34, 45) are derived elsewhere only once. The sister-grouping of *Pectiniscardia* with *Cnismorectis* + *Hormantris*, found by all cladistic methods and average-link cluster analysis, is supported by two derived characters and three reversals. One character (54) is uniquely derived; the other is multiply derived. One of the reversals (13) is of a character that is otherwise uniquely derived; the other two characters are multiply derived and reversed.

The Old World and New World species of *Morophagoides* are grouped in all analyses; on the PAUP tree their relationship is supported by two derived characters, one unique (29) and the other multiply derived, and two reversals, both of characters multiply derived and reversed.

Two other groups in the PAUP tree are defined by uniquely derived characters that exhibit also a single reversal. Characters 9 and 13 appear in the data matrix as synapomorphies of

Diataga and the *Morophaga sistrata*-group and of *Cranaodes* and *Gentingia* respectively but attract a high number of 'hits' (see above) and are accounted for in the PAUP tree as homoplasious. No method of analysis recovers these pairs of OTUs together.

Other groups are not consistently recovered by either phenetic or cladistic methods although there is strong suggestion of a close relationship between the *Morophaga choragella*-group and *M. clonodes* from phenetic analysis.

Groups other than the six discussed above may be defined only in terms of characters that are highly homoplasious; none of the groups is convincing. The limited phylogenetic hypothesis proposed here is therefore that the six groups (with the possible exception of *Miniscardia* + *Necroscardia*) constitute monophyletic entities. The remainder of the PAUP tree is adopted as a curatorial convenience.

Discussion

The impossibility of obtaining a consistent classification of OTUs within the Scardiinae reflects two factors, the high degree of homoplasy encountered throughout the group, and the limitations placed upon the range of characters with which it was possible to work through paucity of material.

Studies such as this underline the dangers of subjective character-assessment. Spectacular specialized structures such as elongate corematal apodemes (character 15) or the valval pectinifer (present in two *Morophaga* species and *Pectiniscardia*) prove to be homoplasious, while apparently insignificant characters such as abdominal microtrichia (32, 33) would appear to have much greater 'information value' in classification. Certain characters are alarmingly homoplasious, for example dorsal fusion (or otherwise) of the tegumen, modification of the juxta, presence or absence of coremata, reduction of the maxillary palpus, and surface structure of the aedeagus. The homoplasy of the coremata has already been alluded to (Robinson, 1981) but the other characters are 'traditional' taxonomic characters and, if their behaviour in other groups parallels that in the Scardiinae, our trust in them is perhaps misplaced.

It is not suggested here, of course, that phenetic methods should produce results congruent with those of cladistic techniques. However, given that the criterion for clustering or agglomeration is the pattern of distribution of '1's in the data matrix (apomorphies among OTUs) then mimicry of pattern will tend to emerge in the form of the common occurrence of (usually terminal) groups or clusters. However, it is axiomatic that phenetic techniques cannot be relied upon to identify monophyletic groups. Cladistic testing of phenetic clusters is necessary to establish that they are natural groups in the phylogenetic sense. The weaknesses of both methods in situations involving homoplasy are obvious. Phenetic classifications are even more unlikely to be natural classifications.

Use of the methods described above permits the identification of groups that are recovered consistently and which might be described as 'robust groups'. Cladistic methods identify those characters by which such robust groups may be defined. Character-compatibility methods measure objectively (within the context of the data) the robustness of characters. Robust groups of OTUs are usually defined by robust characters. Character-compatibility methods further identify and predict (by the 'hits' procedure) the occurrence of single instances of convergence or reversal. A consensus obtained using these methods provides a strong (but, admittedly, subjective) indication that robust groups are natural groups, an indication that cannot be obtained by any one method in isolation.

The classification offered here is, therefore, a very conservative one. Nevertheless, it is entirely at variance with that proposed by Zagulajev (1973). He suggested *Amorophaga* and *Morophagoides* as sister-groups, *Scardia* as the sister-group of these, and *Morophaga* as the sister-group of all three (Zagulajev's *Scardia* includes *Montescardia*, separated in the present work).

Geographical distribution

It has been impossible to resolve fully a phylogeny for the Scardiinae so comment on biogeography in relation to phylogeny must needs be restricted to the few unequivocal sister-groupings recognized.

The overall pattern of diversity of the Scardiinae is dominated by *Tinissa*, with 34 species. These range from the Afrotropical region (5 species) through the Oriental region (19 species) to the Australian region (New Guinea, Solomon Is, Australia – 13 species) but are poorly represented in Australia itself where there are only two species, both of these found also in New Guinea. Further comments on the distribution of *Tinissa* have been given elsewhere (Robinson, 1976*a*; 1981). Apart from *Tinissa*, Australia has only one other species of Scardiinae, *Morophaga clonodes*. Its possible sister-group (suggested by only phenetic analyses) is the *M. choragella*-group which consists of four Palaearctic species. Penetration of the Australian region by Scardiinae is restricted otherwise to *Morophaga bucephala* which ranges from Japan to New Guinea.

Excluding *Tinissa*, Scardiinae are represented in the Afrotropical region almost as poorly as they are in Australia. Two of the four species of the *Morophaga bucephala*-group occur there, one widespread in forested areas of the African mainland and the other restricted to Madagascar. In addition to these, four monobasic Scardiinae genera have been found in Africa. Each is known only from a few specimens and the phylogenetic position of each is uncertain. Three of the genera, *Afroscardia, Leptozancia* and *Philagrias*, occur on the mountains of east Africa at altitudes over 2400 m (8000′). The fourth, *Semeoloncha*, occurs in the rain forests of west Africa. The current picture of Scardiinae diversity in the Afrotropical region may, however, be misleading. Few specimens have been collected yet the generic diversity among these is great. It is probable that the material available in collections falls far short of being a true representation of the group. It is likely that further collecting and, particularly, the use of specialized collecting techniques, may increase substantially the range of Scardiinae genera known from the Afrotropical region.

No Scardiinae are known from southern South America (Patagonia) despite extensive recent collecting of Microlepidoptera by workers from the U.S.A. and Denmark. The virtual absence of Scardiinae from the southern continents suggests strongly that the group evolved after the break-up of Gondwanaland.

In contrast, the Neotropical region has a greater concentration of Scardiinae genera (13) and (if *Tinissa* in the Oriental region is excluded) of species (32) than any other region. Again, the number of specimens known of each species is small and the diversity suggested here is probably a considerable underestimate. Three genera, *Morophagoides*, *Daviscardia* and *Diataga*, are particularly diverse, accounting for 19 of 32 species. All are found in forest habitats and have a considerable altitude range, *Morophagoides* especially so, *M. iulina* having been collected at at least 2600 m (8500′). The remaining Neotropical genera occur in forested habitats generally below about 2000 m (6550′) from the eastern slopes of the Andes and the mountains of Central America (*Cnismorectis*, *Necroscardia*, *Moscardia*, *Cranaodes*) to the delta forest of the Amazon basin (*Perilicmetis*, *Miniscardia*); *Bythocrates* is known only from Trinidad, and *Diataga* is widespread. *Pectiniscardia* and *Hormantris* are exceptional in that they are found at altitudes comparable to those at which live the Scardiinae of the east African mountains. Both genera are monobasic and represented by single specimens collected in the central Cordillera of Colombia at over 3500 m (11,500′). *Hormantris* is the sister-group of *Cnismorectis*. A single example of *Scardia anatomella* is known from the Neotropical region.

The Nearctic Scardiinae fauna is poor with only eight genera and 10 species. One species of *Diataga*, one of *Miniscardia*, two of *Morophagoides* and two of *Daviscardia* represent the diverse Neotropical element at its northern limit. *Montescardia*, *Scardia* and *Amorophaga* are Holarctic genera each represented by single species in North America. The monobasic *Scardiella* is the only Scardiinae genus restricted to the Nearctic region.

The Palaearctic region has a similarly sparse Scardiinae fauna, with five genera, these represented in both the eat and the west of the region. The 16 Palaearctic species are divided evenly between west and east. *Morophagoides* (also in the Neotropical and Nearctic regions) is represented by three species, the Holarctic genera *Montescardia*, *Scardia* and *Amorophaga* by two, three and three species respectively. The remaining six species are those of *Morophaga*.

This genus is also well-represented in the Oriental region with a further six species. The paucity of Scardiinae in the Holarctic region may be connected with the presence of Nemapogoninae as part of the guild of fungivorous larvae. Nemapogoninae are absent from both the Old and New World tropics.

Four genera and 10 species of Scardiinae, excluding *Tinissa*, are now recorded from the Oriental region. In addition to representatives of *Morophaga* (including the *sistrata*-group, endemic to the Oriental region), there are two species of *Scardia*, one of *Cranaodes* (known otherwise from the Neotropical region), and the monobasic genus *Gentingia*, of uncertain affinities.

The sister-group relationship of *Daviscardia* and *Scardia* provides a scenario of dispersal and speciation that may be mirrored also in other groups. *Daviscardia* is a Neotropical genus with a further two species in the U.S.A. *Scardia anatomella* (also from the U.S.A.) is suggested (below) to be the sister-group of all other *Scardia*. The pattern of present-day distribution of *Scardia* species suggests dispersal of the Old World *Scardia* ancestor from North America to eastern Asia with progressive southward and westward dispersal and isolation to provide the hypothesized phyletic sequence: *assamensis* (Himalayas/N. India), *amurensis* (E. Palaearctic/ Japan), *alleni* (Borneo), and *boletella* and *caucasica* (W. Palaearctic). In this case speciation has involved adaptation within one genus to a wide variety of climates.

It is tempting, particularly in view of the presence in the Oriental region of what may be a genuine *Cranaodes* species, to view the phylogeny of the Scardiinae in terms of a series of dispersal events from a Neotropical centre. This model is fitted, for example, by *Morophagoides* and by the hypothesis of a sister-group relationship for *Necroscardia* and *Tinissa*, the Afrotropical origin for *Tinissa* (Robinson, 1976*a*) now being unlikely in the light of the discovery of a 'primitive' species in the New Guinea subregion (Robinson, 1981). However, in the absence of a more sound phylogenetic hypothesis this can only be speculative.

Abbreviations

BMNH	British Museum (Natural History), London, England
CAS	California Academy of Sciences, Los Angeles, California, U.S.A.
EIHU	Entomological Institute, Hokkaido University, Sapporo, Japan
HNHM	Hungarian Natural History Museum (Természettudományi Múzeum), Budapest, Hungary
LN	Landessamlungen für Naturkunde, Karlsruhe, West Germany
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.
MINGA	Muzeul de Istoria Naturala 'Grigore Antipa', Bucharest, Rumania
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin, East Germany
NM	Naturhistorisches Museum, Vienna, Austria
NMNH	National Museum of Natural History, Smithsonian Institution, Washington D.C., U.S.A.
RNH	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands
SAM	South Australian Museum, Adelaide, Australia
SM	Sarawak Museum, Kuching, Sarawak
UC	University of California, Berkeley, California, U.S.A.
ZI	Zoological Institute of the Academy of Sciences, Leningrad, U.S.S.R.
ZM	Zoologisk Museum, Copenhagen, Denmark

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SCARDIINAE Eyer

Scardiinae Eyer, 1924: 320; Zagulajev, 1966: 634; Căpuşe, 1968: 122; Zagulajev, 1973; Gozmány & Vári, 1973: 147. Type-genus: *Scardia* Treitschke.

Semeolonchini Căpuşe, 1971: 232. Type-genus: *Semeoloncha* Gozmány. **Syn. n.**

Tinissinae Gozmány & Vári, 1973: 84; Robinson, 1976; Robinson, 1981. Type-genus: *Tinissa* Walker. **Syn. n.**

ADULT. Vertex with tufts of erect scales convergent towards mid-line of head and tending to form whorls at back of head; scale bases often divided medially and transversely into four groups by narrow bare areas. Frons with tufts of erect and slightly upward-directed scales convergent with scale tufts of frontovertex; scale-bases either scattered evenly or forming upper medial group (sometimes divided vertically) and pair of lateral groups close to tentorial pits. Epipharynx triangular or hardly developed. Pilifers present except in *Hormantris* and *Cnismorectis* (Figs 180–182). Mandible present, elongated transversely. Galeae present in all species examined except *Tinissa polystacta*, only rarely associated, if at all, rarely much longer than second segment of labial palpus. Cibarium without chemoreceptor pits in *Morophaga*, *Scardia*, *Tinissa* and *Montescardia* but pits present in *Bythocrates*, *Perilicmetis* and *Cnismorectis* (not checked in other genera). Maxillary palpus elongate, 5-segmented and folded in many species but in some substantially reduced in length and with five, four or three segments; second segment frequently with thick patch of dark scales above; first segment lacking sensilla trichodea; terminal segment with whorl of pale scales in most species of *Tinissa*. Labial palpus three-segmented, elongate, upturned at about 60°; second segment enormously elongated in *Hormantris* and *Cnismorectis*; lateral bristles of second segment sparse, scattered along length and never concentrated apically to form a terminal whorl; third segment with vom Rath's organ either present but small or apparently absent. Antenna one-half to four-fifths length of forewing. Scape elongate barrel-shaped; pecten present with 4–10 sparse bristles or large and thick with 15 to more than 40 bristles. Pedicel short, barrel-shaped, less than twice as long or broad as adjacent flagellar segments. Flagellar segments ciliate, cilia short in females, rarely longer than flagellar diameter, more elongate in males, up to four or five times as long as flagellar diameter, in some taxa restricted to ventral half of segment; each segment with whorls of overlapping scales arranged in longitudinal rows, in some genera the whorl incomplete ventrally; most segments with well-developed palisaded sensilla coeloconica. Forewing with all veins present; cell with at least traces of forked M and with at least traces of chorda; stalking of R_3 and R_4, R_4 and R_5, M_2 and M_3, or M_3 and CuA_1 occurs in some genera (Figs 183, 184). Pattern usually cryptic, resembling mottled tree-bark, or with dark ground colour and pale apex and dorsum, or consisting of bold blotches on a paler background, rarely almost unicolorous (*Bythocrates*, *Afroscardia*, some *Tinissa*). Hindwing with all veins present, trace of forked M in cell; female with three (or, occasionally, four) frenular bristles (but with about 15 in *Scardia*). Legs without significant modification; spines absent; epiphysis present, strong, elongate peg-shaped; mid-tibia of many species with oblique pale band on outer surface; hind tibia with conspicuous distal whorl of erect scales in *Tinissa*.

GENITALIA ♂. Eighth segment with elongate tubular sternal apodemes associated with coremata in *Morophaga choragella*-group, *Diataga* and *Necroscardia*; flap-like apodemes from corners of sternite present in *Semeoloncha*, *Moscardia* and *Cranaodes*; sternite with postero-lateral processes in *Tinissa torvella* and *T. ruwenzorica*; eighth segment otherwise unmodified; coremata present or absent in pleural membrane. Saccus well developed, longer than broad in most genera. Tegumen broad, angled dorso-ventrally in most species and, in most, fused dorsally. Uncus bilobate, lobes sometimes fused with tegumen and with each other, complexly modified in some taxa but in others a pair of simple setose lobes. Gnathos absent. Subscaphium, if present, ribbon-like, ill-defined, but modified with pair of setose processes in one species of *Tinissa*. Juxta, if present, simple or strongly modified, fused with valvae or free, in *Tinissa* and *Necroscardia* enormously enlarged and forming an integral part of a valve-juxta complex. Transtilla, if developed, forming a dorsal collar (*Morophaga*, *Diataga*) or, rarely, modified with labides (*Tinissa*, *Leptozancla*). Valva present (except, possibly, in *Leptozancla*), variously modified; valvae free or, in six genera, fused ventrally to form a single movable complex; pectinifer present in two species of *Morophaga* and in *Pectiniscardia*; articulated ventrodistal process absent. Aedeagus simple, free, with or without carinae, straight or almost so (but highly modified and partially fused with the valvae in *Montescardia*); inception of bulbus ejaculatorius laterobasal or subbasal; vesica smooth or with fine spicular cornuti (microtrichia) or, in a few species, with stout cornuti.

Genitalia ♀. Seventh segment with strongly spined sternite in *Necroscardia funeratella*; reduced to a narrow band and with corethrogyne in most *Tinissa* species; corethrogyne also present but segment of normal size in *Diataga* and *Cnismorectis*; tergite with spined posterior lobe in a few *Tinissa* species; otherwise unmodified. Eighth tergite of most species with 2–5 pairs of strong terminal or subterminal setae plus sparse smaller setae and, in some species, with a few scattered sensilla coeloconica and/or sensilla basiconica. Eighth sternite usually strongly sclerotized and modified to accommodate broad ostium, frequently with paired processes ventral, lateral or immediately dorsal to ostium each bearing a pair of strong setae. Antrum invariably developed, variously modified, incorporating inception of ductus seminalis dorsally or paradorsally or terminating just posterior to inception of ductus seminalis. Inception of ductus seminalis very close to ostium in some taxa, these frequently with bulbous outgrowth from ventral wall of ovipositor overlying ostium and possibly functioning as a closure. Ductus bursae looped to the right in some *Tinissa* and *Morophaga*, its internal surface with microtrichia or overlapping plaques in many species; some genera (notably *Tinissa*) with regular transverse constrictions such that the ductus resembles a shower-hose. Corpus bursae thin-walled, with signa in *Gentingia*, *Bythocrates* and *Morophagoides* only. Ovipositor elongate, slender, with single infold at rest, in most taxa about as long as the last three abdominal segments; posterior half with ventral rods arising from bases of papillae anales; apophyses posteriores extending anteriorly beyond margin of eighth sternite by about once or twice length of sternite.

Pupa (Figs 185–192). Antennae almost reaching wing-tips; wing-tips reaching fourth abdominal segment. Anterior and posterior transverse bands of dorsal spines present on abdominal segments 3–7 in males and 3–6 in females (anterior band on segment 3 represented only by a smooth ridge in *Diataga*); single (anterior) band present on segments 8 and 9 in males and 7–9 in females (but no spines on segments 8 and 9 and only anterior band present on segment 7 in *Diataga*; band on segment 9 reduced to only four spines in one example of *Morophaga sistrata*); trace of anterior band present also on second abdominal segment in *Scardia*. Band of spines on segment 8 incomplete medially in *Morophagoides*, complete in all other taxa examined (see 'Remarks'); band of spines on segment 9 incomplete medially in all taxa except *Morophaga cremnarcha* and in two of three males of *Morophaga morellus*. Cremaster with two pairs of ventral hooks in *Scardia* and some *Morophaga* but smaller inner pair absent in *Diataga* and *Morophagoides* and strongly reduced or absent in *Morophaga*. In rotting wood or in fungal sporophores, protruded prior to emergence of adult.

Larva (Figs 193–197). A1 of head only one-third length of A2; six poorly defined ocellar lenses present. L-group of prothorax bisetose; D1 setae of abdominal segments more widely separated than D2 setae; L-group of ninth abdominal segment bisetose. Dorsal cuticle with strong microtrichia. In rotting wood permeated by fungal hyphae or in hard (persistent) fungal sporophore.

Remarks. Description of the scardiine pupa is based on the study of *Morophaga choragella* (several examples of both sexes), *M. morellus* (3 ♂), *M. cremnarcha* (1 ♀), *M. hyrcanella* (1 ♀), *M. sistrata* (2 ♀), *Diataga leptosceles* (1 ♂, 1 ♀), *Scardia anatomella* (several examples of both sexes) and *Morophagoides burkerella* (1 ♀). Additionally, figures of female pupae of *Scardia boletella* and *Morophagoides moriutii* are given by Zagulajev (1973) and Moriuti (1976) respectively. The larval diagnosis is based on study of three larvae of *Diataga leptosceles* from Turrialba, Costa Rica, on the detailed description of *Morophaga choragella* by Hinton (1956), and on figures of *Scardia boletella* by Zagulajev (1973) and of *Morophagoides moriutii* by Moriuti (1976).

The terminology of larval setae adopted here for *Diataga leptosceles* follows that used by Hinton (1956) for *Morophaga choragella*. However, Moriuti (1976) uses the earlier terminology of Hinton (1946) and the reader is referred to MacKay (1963) for a discussion of the still unresolved differences between the two systems. Hinton (1946) terms the four anterior macrosetae of the prothoracic shield XD1, XD2, SD1 and SD2 (D1, XD1, XD2 and SD2 of Hinton, 1956) and the two posterior macrosetae D1 and D2 (D2 and SD2 of Hinton, 1956); the L-group setae of the ninth abdominal segment are L1 and L3 (L1 and L2 of Hinton, 1956).

The larva of *Diataga leptosceles* is similar to that of *Morophaga choragella* as described by Hinton but the positions of Va and Pb on the head are variable; the labrum has only three pairs of marginal setae, not four as in *choragella* or *Morophagoides moriutii* (Moriuti, 1976). On the abdominal segments D1 is strongly displaced ventrad in *Diataga* in comparison with *Morophaga* and *Morophagoides*. In *Morophagoides* the D-group setae are almost level; in *Morophaga* D1 is displaced slightly ventrad. In *Morophagoides* L3 on the abdominal segments is placed slightly further posteriorly than in *Diataga* or *Morophaga*.

Key to genera and species-groups of Scardiinae (males)

1 Hind tibia with strongly developed apical and subapical tufts of elongate, dark-tipped scales **TINISSA** (p. 108)
– Hind tibia rough-scaled above but scales never concentrated into conspicuous distal tufts 2
2 Antenna lacking dorsal cilia – cilia roughly restricted to ventral 180 degrees of each segment..... 3
– Antenna with dorsal cilia – cilia arranged through 360 degrees of each segment..................... 10
3 Antennal segments completely scaled 4
– Antennal segments with ventral surface lacking scales 17
4 Antennal cilia shorter than 1·5 × flagellar diameter 5
– Antennal cilia longer than 1·5 × flagellar diameter 6
5 Forewing with M_3 and CuA_1 stalked; forewing speckled greyish brown with dark brown subterminal fascia (Fig. 40).. **PERILICMETIS** (p. 92)
– Forewing with M_3 and CuA_1 separate; forewing dark purple-brown with pale termen and dorsum (Figs 41, 42).. **MOSCARDIA** (p. 93)
6 Pilifers absent; second segment of labial palpus longer than width of head (*cf.* Fig. 182) **HORMANTRIS** (p. 102)
– Pilifers present; second segment of labial palpus shorter than width of head (Figs 180, 181)....... 7
7 Forewing with M_3 and CuA_1 stalked.. **MINISCARDIA** (p. 104)
– Forewing with M_3 and CuA_1 separate 8
8 Forewing pattern consisting of dark purple-brown ground-colour with pale terminal fascia, and small pale spots on posterior margin (Figs 53, 54); juxta complex, divided, forming a functional part of the valvae (Figs 108, 109).. **NECROSCARDIA** (p. 106)
– Forewing pattern consisting of dark blotches on a pale bronze or cream ground-colour (but see *Cranaodes oroya*); juxta simple, undivided, or fused with valvae and not recognizable 9
9 Forewing with R_3 and R_4 stalked (Fig. 184); tegumen unbroken, completely sclerotized dorsally; valvae fused ventrally; aedeagus with fine spicular carinae (Fig. 103) **GENTINGIA** (p. 95)
– Forewing with R_3 and R_4 separate; tegumen broken dorsally by at least a membranous suture-line; valvae separate; aedeagus smooth-surfaced (Fig. 106) .... **CRANAODES** (p. 98)
10 Antennal cilia longer than 1·5 × flagellar diameter 11
– Antennal cilia shorter than 1·5 × flagellar diameter 14
11 Antennal scape with more than 15 pecten bristles 12
– Antennal scape with fewer than 15 pecten bristles 13
12 Maxillary palpus with fewer than 5 segments; forewing uniformly brown (Fig. 51); juxta simple, entire. (Afrotropical region).. **AFROSCARDIA** (p. 110)
– Maxillary palpus with 5 segments; forewing with mottled pattern or with pale markings concentrated at termen, costa and dorsum; juxta complex, divided, fused with valvae. (New World) .... **MOROPHAGOIDES** (part) (p. 65)
13 Small (13–16 mm) Nearctic species; uncus complex, forming pair of widely separated digitate processes, not fused with tegumen; valva with simple ventral margin (Fig. 107) **SCARDIELLA** (p. 108)
– Large (27 mm) Neotropical species; uncus simple – a pair of setose lobes fused with tegumen; valva with ventral pectinifer of spines .... **PECTINISCARDIA** (p. 101)
14 Antennal scape with more than 15 pecten bristles 15
– Antennal scape with fewer than 15 pecten bristles 16
15 Coremata present in eighth abdominal segment; juxta complex, enveloping aedeagus **MONTESCARDIA** (p. 74)
– Coremata absent from eighth abdominal segment; juxta, if present, fused with valvae and not recognisable.. **MOROPHAGOIDES** (part) (p. 65)
16 Large (20 mm) Afrotropical species; maxillary palpus 5-segmented; coremata present in eighth abdominal segment.. **SEMEOLONCHA** (p. 97)

– Small (11–14 mm) Neotropical species; maxillary palpus with fewer than 5 segments; coremata absent from eighth abdominal segment .... ***BYTHOCRATES*** (p. 77)

17 Forewing with R_3 and R_4 free, widely separated at base (if R_3 and R_4 close together at base, then forewing pattern mottled purple-brown with pale termen and dorsum) 18

– Forewing with R_3 and R_4 fused, stalked or approximated at base; forewing lacking paler apex and dorsum 20

18 Pilifers absent; second segment of labial palpus longer than width of head (Fig. 182) ***CNISMORECTIS*** (p. 102)

– Pilifers present; second segment of labial palpus shorter than width of head 19

19 Coremata present in eighth abdominal segment; juxta complex, fused with valvae ***SCARDIA*** (p. 86)

– Coremata absent from eighth abdominal segment; juxta, if present, fused with valvae and not recognizable .... ***DAVISCARDIA*** (p. 78)

20 Forewing with white or off-white ground-colour, marked with bold purple-brown basicostal and postero-medial blotches, with a group of smaller spots along costa becoming progressively larger towards apex (Figs 67–70) .... ***MOROPHAGA bucephala*-group** (p. 121)

– Forewing pattern cryptic, resembling moss or tree-bark, or longitudinally streaked 21

21 Forewing pattern consisting of either brownish grey or khaki longitudinal streaks (Figs 57–59); uncus complex .... ***AMOROPHAGA*** (p. 111)

– Forewing pattern resembling moss or tree-bark; uncus simple 22

22 Forewing slender; veins $R_3 + R_4$ and $M_2 + M_3$ fused, stalked or closely approximated at base (Fig. 183); outer mid and proximal hind tibial spurs very short – less than 0·4 length of inner spurs (Neotropical species) .... ***DIATAGA*** (p. 114)

– Forewing broader; only R_3 and R_4 fused, stalked or closely approximated at base; outer and proximal hind tibial spurs usually more than 0·4 length of inner spurs (but slightly less than 0·4 in the Oriental *Morophaga sistrata*-group) 23

23 Coremata absent from eighth abdominal segment 24

– Coremata present in eighth abdominal segment 25

24 Outer mid and proximal hind tibial spurs less than 0·4 length of inner spurs; apices of uncus lobes fused together and tapered to form a small hook; vesica with line of strong thorn-like cornuti (Figs 131–137) .... ***MOROPHAGA sistrata*-group** (part) (p. 126)

– Outer mid and proximal hind tibial spurs more than 0·4 length of inner spurs; apices of uncus lobes separate; cornuti small and spicular (Fig. 138) ...... ***MOROPHAGA clonodes*-group** (p. 129)

25 Apices of uncus lobes fused and tapered to form a small hook; vesica lacking any ornamentation (Fig. 135) .... ***MOROPHAGA sistrata*-group** (part – ***borneensis***) (p. 126)

– Apices of uncus lobes separate; vesica with minute spicular cornuti 26

26 Uncus lobes short, hardly extending beyond apices of valvae, square-ended ***MOROPHAGA morellus*-group** (p. 125)

– Uncus lobes elongate, extending well beyond apices of valvae, apices tapered and rounded .... ***MOROPHAGA choragella*-group** (p. 130)

Key to genera and species-groups of Scardiinae (females)

(Females of *Moscardia*, *Semeoloncha*, *Afroscardia*, *Pectiniscardia*, *Perilicmetis* and *Hormantris* are unknown.)

1 Hind tibia with strongly developed apical and subapical tufts of elongate, dark-tipped scales; most species with seventh segment reduced, tergite and sternite more than twice as wide as long, with corethrogyne of dense, fine, elongate hair-scales .... ***TINISSA*** (p. 108)

– Hind-tibia rough-scaled above, but scales never concentrated into conspicuous distal tufts; seventh segment not reduced, corethrogyne present in *Cnismorectis* and *Diataga* only 2

2 Forewing pattern consisting of longitudinal streaks or a 'moss' pattern disrupted by longitudinal streaking (Figs 57–59) .... ***AMOROPHAGA*** (p. 111)

– Forewing pattern not consisting of longitudinal streaks 3

3 Forewing uniformly dark purple-brown .... ***BYTHOCRATES*** (p. 77)

– Forewing variegated 4

4 Forewing pattern consisting of large purple-brown spots on a paler ground-colour 5

– Forewing coloration forming either a cryptic 'moss' or 'tree-bark' pattern or consisting of a pale termen and dorsum on a darker ground-colour 7

5 Forewing ground-colour white or off-white (Figs 67–70) ***MOROPHAGA bucephala*-group** (p. 121)

– Forewing ground-colour pale bronze 6

6 Maxillary palpus short, with fewer than 5 segments; forewing with R_3 and R_4 stalked (Fig. 184) ***GENTINGIA*** (p. 95)

– Maxillary palpus elongate, 5-segmented; forewing with R_3 and R_4 free .... ***CRANAODES*** (p. 98)

7 Forewing with $R_3 + R_4$ and $M_2 + M_3$ stalked or very closely approximated at base (Fig. 183) ***DIATAGA*** (p. 114)

– Forewing with all veins free or only one pair of veins stalked 8

8 Forewing with M_3 and CuA_1 stalked .... ***MINISCARDIA*** (p. 104)

– Forewing with M_3 and CuA_1 free 9

9 Forewing with all veins free 10

– Forewing with R_3 and R_4 fused or stalked 17

10 Forewing pattern composed of pale termen and dorsum on darker ground-colour 11

– Forewing coloration forming a cryptic 'moss' or 'tree-bark' pattern 14

11 Frenulum with more than 10 bristles .... ***SCARDIA*** (p. 86)

– Frenulum with fewer than 5 bristles 12

12 Bursa copulatrix with pair of large, opposed, pouch-shaped signa (Figs 140–144) ***MOROPHAGOIDES*** (part) (p. 65)

– Bursa copulatrix with many fine spicular signa, or without signa 13

13 Antennal pecten with more than 16 bristles; antrum less than one-half length of apophyses anteriores; ductus bursae smooth-walled (Figs 147–151) .... ***DAVISCARDIA*** (p. 78)

– Antennal pecten with fewer than 16 bristles; antrum more than one-half length of apophyses anteriores; ductus bursae with fine, irregular transverse constrictions (Fig. 162) ***NECROSCARDIA*** (p. 106)

14 Pilifers absent; second segment of labial palpus longer than width of head (Fig. 182) ***CNISMORECTIS*** (p. 102)

– Pilifers present; second segment of labial palpus shorter than width of head (Figs 180, 181)....... 15

15 Bursa copulatrix with pair of large, opposed, pouch-shaped signa (Figs 140–144) ***MOROPHAGOIDES*** (part) (p. 65)

– Bursa copulatrix without signa 16

16 Large (22–28 mm) species; antennal pecten with more than 15 bristles... ***MONTESCARDIA*** (p. 74)

– Small (13–16 mm) species; antennal pecten with fewer than 15 bristles........ ***SCARDIELLA*** (p. 108)

17 Intersegmental membrane between eighth and seventh abdominal segments with pair of deep pouches with scobinate inner surfaces (Fig. 172) .... ***MOROPHAGA*** ***clonodes*-group** (p. 129)

– Intersegmental membrane lacking such pouches or, if present, pouches shallow and with smooth inner surfaces 18

18 Corpus bursae not extending anteriorly beyond apophyses anteriores ***MOROPHAGA*** ***morellus*-group** (p. 125)

– Corpus bursae extending anteriorly beyond apophyses anteriores 19

19 Ductus + corpus bursae more than twice length of apophyses anteriores; antrum less than half length of apophyses anteriores (Fig. 179) .... ***MOROPHAGA*** ***sistrata*-group** (p. 126)

– Ductus + corpus bursae less than twice length of apophyses anteriores or, if more, then antrum extending anteriorly beyond apices of apophyses anteriores ***MOROPHAGA*** ***choragella*-group** (p. 130)

MOROPHAGOIDES Petersen

Morophagoides Petersen, 1957: 593. Type-species: *Scardia ussuriensis* Caradja, 1920: 167, by original designation and monotypy.

DIAGNOSIS. Antenna (male) with dorsal cilia, ventral surface scaled; cilia longer than 1·5 × flagellar diameter (but not in species from the Old World). Scape with more than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; mottled coloration forming cryptic, coarse 'moss' pattern (but pale markings of some species concentrated at termen, costa and dorsum). Male lacking coremata in eighth abdominal segment. Male genitalia with complex uncus (simple in *burkerella*) separated from tegumen by narrow band of membrane; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva forming ventral hook or hooks, or with spines; valvae + juxta fused ventrally into a single movable complex, valvae without longitudinal cleft; saccus longer than wide; juxta complex, divided medially; however, juxta, if present, fused with valvae and not recognizable as such in species from the Old World; vesica with spicular cornuti; aedeagus smooth-surfaced, without spicular carinae.

CONSPICUOUS AUTAPOMORPHIES. Female with pair of strong, pocket-shaped signa in bursa copulatrix.

DISTRIBUTION. Western and eastern Palaearctic region; Oriental region – Taiwan; Nearctic region – British Columbia, Washington State, Utah, California; Neotropical region.

BIOLOGY. See under entries for individual species.

Key to species of *Morophagoides*

Males (males of *pythium*, *nimbiferum* and *montium* are unknown)

1 Antennal cilia as long as or longer than 1·5 × flagellar diameter; juxta complex, bipartite. (New World) 2
– Antennal cilia shorter than 1·5 × flagellar diameter; juxta, if present, fused with valvae and not recognizable. (Old World) 4
2 Uncus with lateral margins strongly infolded, sharply serrate; valva with tuft of strong bristles on inner surface; juxta small, kidney-shaped; vesica without cornuti (Fig. 85) .... ***iulina*** (p. 73)
– Uncus with lateral margins smooth, not strongly infolded; valva with scattered fine setae on inner surface; juxta greatly enlarged, V-shaped; vesica with single strong cornutus 3
3 Uncus with lateral margins slightly infolded, corners of uncus with blunt protuberance (Fig. 83) ***berkeleyella*** (p. 69)
– Uncus with lateral margins not infolded, corners of uncus not protuberant (Fig. 84) ***burkerella*** (p. 70)
4 Lateral margins of uncus straight, apices slightly tapered and hooked .... ***iranensis*** (p. 66)
– Lateral margins of uncus produced to form a ventrally-directed process 5
5 Lateral processes of uncus short, subapical, double-ridged at extremity (Fig. 80) ***ussuriensis*** (p. 67)
– Lateral processes of uncus elongate, apical, extremity irregularly rounded (Figs 81, 82) ***moriutii*** (p. 68)

Females (females of *iulina* are unknown)

1 New World species 2
– Old World species 6
2 Antrum one-half or more length of apophyses anteriores 3
– Antrum less than one-quarter length of apophyses anteriores 5
3 Posterior margin of eighth sternite with deep, narrow medial emargination (m-shaped), with pair of short, blunt, setose subapical lobes (Fig. 140) .... ***burkerella*** (p. 70)
– Posterior margin of eighth sternite ill-defined, surmounted by pair of strong caudally-directed setose digitate processes 4
4 Ostium narrow, ventral (anterior) margin deeply U-shaped; antrum tapered posteriorly (Fig. 143) .... ***pythium*** (p. 72)
– Ostium broad, ventral (anterior) margin transverse; antrum flared posteriorly .. ***berkeleyella*** (p. 69)
5 Ventral margin of ostium extended posteriorly as a pair of setose flaps, m-shaped (Fig. 144) ***montium*** (p. 71)
– Ostium set in membrane at anterior margin of eighth sternite, with pair of strongly sclerotized setose digitate processes posterior to ostium (Fig. 142) .... ***nimbiferum*** (p. 72)
6 Antrum running anteriorly from ventral lip of ostium without modification .... ***iranensis*** (p. 66)
– Antrum with strongly sclerotized triangular pocket in ventral wall, lip of pocket forming ventral lip of ostium 7
7 Ventral margin of ostium only slightly concave; antrum narrow, no broader than width of ostium .... ***ussuriensis*** (p. 67)
– Ventral margin of ostium strongly concave; antrum broadened at one-half to 1·5 × width of ostium (Fig. 141) .... ***moriutii*** (p. 68)

Morophagoides iranensis Petersen

(Fig. 9)

‡*Morophagoides iranensis* Petersen, 1959: 573, 577. [Nomen nudum.]
Morophagoides iranensis Petersen, 1960: 1. Holotype ♂, IRAN (LN) [not examined].

ADULT (Zagulajev, 1973: fig. 93; Fig. 9). ♂, 17–23 mm; ♀, 19–28 mm. Vertex and frons cream, some brown scales close to eyes. Labial palpus cream, dark brown on outer surface of first and second segment. Maxillary palpus mixed cream and dark brown, 5-segmented, reaching a little more than one-half length of second segment of labial palpus. Antennal scape, pedicel and basal flagellar segments dark brown above; cilia 1·0 × (♂) or 0·4 × (♀) flagellar diameter. Thorax cream flecked with light brown; tegula dark brown, cream at apex only. Forewing cream, scattered orange-brown scales along veins, strongly marked with dark brown to form a coarse, cryptic pattern resembling tree-bark. Hindwing light greyiwh cream with slightly darker greyish flecks. Legs cream; fore- and mid-legs strongly marked above with dark brown but pale at articulations; outer surface of mid-tibia with distinctive transverse pale streaks; outer mid-tibial and outer proximal hind tibial spurs 0·7 length of inner spurs.

Genitalia ♂ (Petersen 1960: fig. 1; Zagulajev, 1968: fig. 4; Zagulajev, 1973: figs 15D, 94). Saccus almost an equilateral triangle; uncus lobes large, divergent, elongately triangular, hooked at the apices. Subscaphium not developed. Juxta, if present, fused with valvae and not recognizable as such; transtilla not developed. Valva triangular, with large conical dorsocaudally-directed medial process; smaller blunt process from internal surface of valva close to base of ventral margin. Aedeagus about 10 × as long as broad in middle, with blunt subapical carina; vesica without cornuti (but large microtrichia possibly present).

Genitalia ♀ (Zagulajev, 1968: fig. 5; Zagulajev, 1973: figs 95, 96). Eighth tergite as long as eighth sternite, with three or four pairs of strong apical setae; eighth sternite forming pair of stout, setose, caudally-directed lobes lateral and dorsal to ostium; ventral margin of ostium slightly concave, protruded deeply ventrad. Antrum thick-walled, longitudinally constricted dorsoventrally, lined with microtrichia, twice length of eighth sternite. Ductus bursae thin-walled, finely microtrichiate, extending well beyond apices of apophyses anteriores. Corpus bursae ovate, with pair of small signa, each a flattened cone invaginated into wall of corpus bursae; bursa copulatrix overall more than twice length of apophyses anteriores.

Distribution. Iran; U.S.S.R. (Caucasus).

Biology Zagulajev (1973) has bred this species from a variety of polypores (*Fomes*, *Ganoderma*, *Polyporus*, *Coriolus*) on *Quercus*, *Zelcova* and *Parrotia* in the Caucasus.

Material examined. 108 ex., 10 pupae.
U.S.S.R.: 1 ♂, Adzharia, 15.vi.1969 (*Zagulajev*); 1 ♀, Georgia, 19.viii.1972 (*Zagulajev*) (BMNH). 'Central Europe': 1 ♂ (BMNH). Also a further 105 ex., 10 pupae (ZI) (see Zagulajev, 1973).

Remarks. The specimen from 'Central Europe' bears the registration number [18]76-75: this refers to an identified synoptic collection of 2500 European Microlepidoptera purchased from Staudinger. This specimen, with the reference number 687, was bought as an example of 'Scardia boleti' (i.e., *Morophaga choragella*) (BMNH Accession Register). It must be assumed that its locality label is as incorrect as its identification.

The three Old World *Morophagoides* species are allopatric and *iranensis* is the only *Morophagoides* to occur in the western Palearctic region. It differs from *ussuriensis* and *moriutii* in lacking any dark scaling on the third segment of the labial palpus but apart from this difference the three species are externally quite similar. The male genitalia of *iranensis* are distinguished by the divergent uncus lobes with hooked apices, and by the process from the valva being broadly conical: in the other two species the uncus lobes each bear a ventrally-directed nodular process, and the process from the valva is slender. The female genitalia of *iranensis* lack the conspicuous ventral triangular pocket that forms the ventral margin of the ostium in *ussuriensis* and *moriutii*; instead, the form of the antrum is conventional.

A tentative phylogeny for *Morophagoides* cannot be resolved because of the lack of material of most species. However, the Old World and New World species may form separate monophyletic groups (the New World species have a conspicuously modified juxta; the juxta is either lost or entirely fused with the valva in species from the Old World; species from the Old World have short antennal cilia; the cilia are long in species from the New World). Within these groups three sister-group pairings are apparent: *moriutii* + *ussuriensis* (synapomorphies: uncus lobes with nodular processes, ventral margin of ostium infolded to form a triangular pocket), *burkerella* + *berkeleyella* (see 'Remarks' for *burkerella*) and *pythium* + *nimbiferum* (see 'Remarks' for *pythium*).

Morophagoides ussuriensis (Caradja)

(Figs 10, 80)

Scardia ussuriensis Caradja, 1920: 167. Lectotype ♂, U.S.S.R. (MINGA), designated by Petersen (1957: 593) [not examined].

ADULT (Zagulajev, 1973: fig. 89; Fig. 10). ♂, 15–19 mm; ♀, 17–23 mm. Coloration and external structure similar to *iranensis* but maxillary palpus light greyish cream, outer surface of third segment of labial palpus with a few brown scales.

GENITALIA ♂ (Petersen, 1957: fig. 246; Zagulajev, 1973: figs 14b, 15G, 90; Fig. 80). Saccus triangular; uncus lobes broad, appressed to tegumen for only medial third of their width; lateral margin produced ventrad to form a strongly sclerotized knuckle-shaped process. Subscaphium indicated only by slight thickening of diaphragma close to base of valval apodemes. Juxta, if present, fused with valvae and not recognizable as such; transtilla not developed. Valva triangular, apex consisting of two overlapping lobes, inner lobe extended mesad to form an elongately triangular process with a sinuate apex, outer lobe forming a blunt process close to ventral margin of valva. Aedeagus about 14 × as long as broad in middle, with digitiform subapical carina; vesica with patch of large spicular microtrichia.

GENITALIA ♀ (Petersen, 1957: fig. 247; Zagulajev, 1973: figs 17G, 18b, 91, 92). Eighth tergite slightly longer than eighth sternite, with three or four pairs of strong subapical setae; eighth sternite forming pair of slender, setose, caudally-directed lobes dorsal to ostium; ventral margin of ostium transverse, protruding strongly ventrad. Antrum with conspicuous and strongly sclerotized triangular pocket in ventral wall, antrum itself behind the pocket, elongate, longitudinally constricted dorsoventrally, lined with microtrichia, about 2·5 × length of eighth sternite. Ductus bursae thin-walled, microtrichia at posterior end around inception of ductus seminalis at junction with antrum. Corpus bursae ovate, with pair of small pouch-shaped signa invaginated into wall of corpus bursae (Zagulajev figures (1973: fig. 92b) a pair of additional minute conical signa situated further posteriorly – I believe this to be an individual variation); bursa copulatrix overall more than twice length of apophyses anteriores.

DISTRIBUTION. U.S.S.R. (Amur, Chabarovsk, Maritime Territories).

BIOLOGY. Zagulajev (1973) associates this species with several genera of trees but no identifications of the host fungus have been made. Moriuti's detailed description (1976) of the life history of 'ussuriensis' from Japan refers to *moriutii* (see below).

MATERIAL EXAMINED. 26 ex., 2 pupae.

U.S.S.R.: 1 ♂, Vladivostok, 21.vii.1876 or 19.vii.1877 (*Christoph*) (genitalia slide no. 12356; BMNH); 1 ex. (head, thorax and forewings only), same data; 1 ♂, Amur, Raddefka, 3.viii.1876 (*Christoph*) (genitalia slide no. 12357; BMNH); 1 ♀, Ussuri Railway, Chabarovsk, 14.vii.1910 (*Borsow*) (BMNH). Also a further 22 ex., 2 pupae (ZI) (see Zagulajev, 1973).

REMARKS. Externally similar to *iranensis* and *moriutii*, *ussuriensis* has a restricted distribution on the easternmost mainland of the U.S.S.R. It is characterized by the conspicuous knuckle-shaped processes of the uncus lobes in the male genitalia. With *moriutii* it shares a conspicuous and diagnostic feature in the female genitalia – a conical ventral pouch, triangular in dorso-ventral view, which runs anteriorly from the ventral (posterior) margin of the ostium: the antrum proper has its posterior inception in the dorsal wall of this pouch although the pouch should be considered a part of the antrum too. Females of *moriutii* have a much more deeply concave ventral ostial margin than those of *ussuriensis*, and the medial region of the antrum is broader. However, the latter difference is subject to considerable intraspecific variation.

Morophagoides moriutii sp. n.

(Figs 11, 81, 82, 141)

[*Morophagoides ussuriensis* (Caradja); Moriuti, 1976: 86; Moriuti, 1982: 164. Misidentifications.]

ADULT (Moriuti, 1976: figs 1, 2; Moriuti, 1982: pl. 2, fig. 17, pl. 236, fig. 3; Fig. 11). ♂, 16–17 mm; ♀, 19–24 mm (Taiwanese specimens – ♂, 24 mm; ♀, 24, 29 mm). Coloration and external structure similar to *iranensis* but, like *ussuriensis*, maxillary palpus light greyish cream, outer surface of third segment of labial palpus strongly marked with brown in basal half.

GENITALIA ♂ (Moriuti, 1976: fig. 3; Moriuti, 1982: pl. 248, fig. 9; Figs 81, 82). Saccus triangular, slightly tapered; uncus lobes divergent, somewhat square, outer corners with ventrally-directed blunt process. Subscaphium poorly developed, represented by slight thickening of diaphragma. Juxta, if present, fused with valva and not recognizable as such; transtilla not developed. Valva with lobed deep apex and with elongate mesally-directed triangular process on internal surface. Aedeagus 15 × as long as broad in middle (stouter, only 10 × in Taiwanese examples), with digitiform subapical carina; vesica with patch of large spicular microtrichia.

GENITALIA ♀ (Moriuti, 1976: figs 4, 5; Fig. 141). Eighth tergite as long as eighth sternite, with three pairs of stout apical setae and about 8 pairs of scattered smaller setae; eighth sternite forming pair of small setose caudally-directed lobes dorsal to ostium; ventral margin of ostium concave, protruded strongly ventrad. Antrum with triangular and strongly sclerotized pocket in ventral wall, antrum itself behind the pocket, elongate, very thick-walled, longitudinally constricted dorso-ventrally, lined with strongly sclerotized and conspicuous nodular microtrichia, about 2·5 × length of eighth sternite. Ductus bursae lined with spicular microtrichia for almost entire length from inception of ductus seminalis anteriorly. Corpus bursae elongately ovate, with pair of pouch-shaped signa invaginated into wall; bursa copulatrix overall more than twice length of apophyses posteriores.

DISTRIBUTION. Japan; Taiwan.

BIOLOGY. Moriuti (1976) has described the biology of this species (as *ussuriensis*) in some detail and figured the larva and pupa. Specimens were reared from the fungus *Lentinus edodes* and its host timber. *Lentinus*, the shiitake fungus, is a valuable commercial crop used in gourmet cookery.

MATERIAL EXAMINED. 9 ex.

Holotype ♂, **Japan**: Honsyu, Okayama, Syootyo, ex cultured wood of *Lentinus edodes*, em. 15.vi.1968 (*Inoue*) (coll. S. Moriuti, Osaka).

Paratypes. **Japan**: 2 ♂, data as holotype (BMNH; coll. S. Moriuti); 1 ♂, 1 ♀, Honsyu, Nara, Katuragisan, ex polyporaceous fungus, em. 31.v.1961 (*Saito*) (BMNH; coll. S. Moriuti); 1 ♀, Honsyu, Nara, Koozindake, 1200 m, 2–3.viii.1971 (*Moriuti*) (coll. S. Moriuti).

Excluded from paratype series. **Taiwan** (Formosa): 1 ♂, 2 ♀, Arizan, 7000′, 14, 17, 17.ix.1906 (*Wileman*) (genitalia slide nos. 12360, 12361; BMNH).

REMARKS. Superficially similar to *iranensis* and *ussuriensis, moriutii* has a NW. Pacific distribution. The genitalia of both sexes are structurally close to those of *ussuriensis* but in the male the process from each uncus lobe is apical and irregular, not subapical and knuckle-shaped as in *ussuriensis*. In the female the ventral lip of the ostium is more strongly concave than in *ussuriensis* and the internal surface of the antrum is more markedly rugose.

The marked difference between the illustration of the uncus lobes of the male by Moriuti (1976: fig. 3) and that given here for a Japanese specimen (Fig. 81) is entirely due to the degree of compression of the preparation: in Fig. 81 the cover-slip is not in contact with the genital armature. Compression of the preparation of a specimen from Taiwan (Fig. 82) splays out the ventral processes of the uncus in similar fashion to that shown in Moriuti's illustration.

Specimens from Taiwan are substantially larger than those from Japan; the aedeagus is slightly thicker and the processes from the uncus are slightly narrower. However, at present I consider the two groups of specimens to be conspecific although I exclude Taiwanese material from paratype status.

Morophagoides berkeleyella (Powell)

(Figs 12, 83)

'Scardia' berkeleyella Powell, [1968]: 303. Holotype ♂, U.S.A. (CAS) [not examined].
Morophagoides berkeleyella (Powell) Davis, 1983: 5.

ADULT (Fig. 12). ♂, 14, 16 mm. Vertex and frons whitish, brown close to eyes. Labial palpus purple-brown but pale buff at apex and articulations and on inner surface. Maxillary palpus pale buff, 5-segmented, extending to about one-half length of second segment of labial palpus, basal three segments flecked above with purple-brown. Antennal scape, pedicel and flagellum dark brown, paler beneath; cilia 1·5 × (♂) flagellar diameter. Thorax and tegula dark brown flecked with paler scales. Forewing pale buff, strongly flecked with dark brown to form a speckled cryptic pattern (similar to that of *Morophaga morellus* in one example; in the other much more variegated and similar to that of *iulina* but more strongly speckled); fringe with pale apical spot, otherwise yellow-grey with grey basal band. Hindwing greyish cream with slightly darker irregular apical spots. Legs greyish ochreous; fore- and mid-legs dark grey above and on sides, articulations conspicuously white; outer mid-tibial spur and outer proximal hind tibial spur 0·7 length of inner spurs.

GENITALIA ♂ (Powell, [1968]: fig. 6; Fig. 83). Saccus narrowly triangular, concave laterally, as long as valva + juxta; uncus lobes moderately sclerotized, sparsely setose, fused dorsally and curved ventrad at sides, thus semicylindrical; corners produced slightly to form pair of shallow triangular processes. Subscaphium narrow, hardly sclerotized, spatulate anteriorly. Juxta partially fused with valvae, bipartite, forming pair of large, blade-shaped caudally-directed processes extending well beyond apices of valvae. Valva short, globose, with digitate apical process. Aedeagus slender, 20 × as long as broad, with strong subapical corniform carina one-seventh length of aedeagus; vesica with fine spicular cornuti (microtrichia).

Genitalia ♀ (Powell, [1968]: fig. 7). (From Powell's description and illustration.) Eighth tergite slightly longer than eighth sternite; eighth sternite forming pair of stout setose lobes caudal to ostium; ventral margin of ostium irregular. Antrum short, elongately funnel-shaped, one-half length of apophyses anteriores. Ductus and corpus bursae pyriform, thin-walled, corpus bursae with pair of small pouch-shaped signa.

Distribution. U.S.A. (California).

Biology. Powell ([1968]) reared the type-series of this species from *Polyporus gilvus* on fallen *Quercus agrifolia*, from dead stems of *Lupinus*, and from a log of *Lithocarpus*: these data are reiterated by Lawrence & Powell (1969).

Material examined. 2 ex.

U.S.A.: 1 ♂ (paratype), California, 2 m. SE. of Canyon, Contra Costa County, ex *Polyporus gilvus* on fallen *Quercus agrifolia*, coll. 5.ii., emerged 9.iv.1967 (genitalia slide no. 2240 [Powell]; BMNH); 1 ♂, California, Burney Mt, 14.viii.1930 (genitalia slide no. 13107; BMNH).

Remarks. Most closely related to *M. burkerella*, *berkeleyella* is, however, a much smaller species. Powell ([1968]) suggests that it is less distinctly marked than *burkerella* but the male from Burney Mt is strongly variegated. The male genitalia of the two species differ substantially only in the form of the uncus lobes (compare illustrations) which are broader and flatter in *burkerella* than in *berkeleyella*. The female genitalia differ in that the signa are substantially larger in *burkerella* than in *berkeleyella*, the antrum is not as tapered and the ventral margin of the ostium is evenly convex. Whereas the caudal lobes of the eighth sternite are elongate and terminal in *berkeleyella*, they are very short and subterminal in *burkerella*.

Morophagoides burkerella (Busck)

(Figs 13, 84, 140)

Scardia burkerella Busck, 1904: 777. Holotype ♀, U.S.A. (NMNH) [examined].
Scardia gracilis Walsingham, 1907: 225. Holotype ♂, U.S.A. (NMNH) [examined]. [Synonymized by Davis (1983: 5).]
Scardia caryophylella Busck, 1908: 92. Holotype ♀, U.S.A. (NMNH) [examined]. [Synonymized by Davis (1983: 5).]
Scardia errandella Busck, 1908: 94. Holotype ♂, U.S.A. (NMNH) [examined]. [Synonymized by Davis (1983: 5).]

Adult (Fig. 13). ♂♀, 19–28 mm. Vertex and frons cream, brown close to eyes. Labial palpus brown, cream at apex and articulations and on inner surface. Maxillary palpus 5-segmented, extending to apex of second segment of labial palpus, buff, strongly flecked above with brown. Antennal scape, pedicel and basal segments of flagellum dark brown above, flagellum lighter distally; cilia 1·5 × (♂) or 0·3 × (♀) flagellar diameter. Thorax and tegula cream, dark brown in anterior half but mixed with cream on thorax. Forewing light yellowish buff, strongly speckled and blotched with dark brown to form a dense, cryptic pattern resembling tree-bark, usually with a strongly defined medial band; fringe barred, with well-defined grey basal line. Hindwing cream tinted with grey, with irregular terminal grey line; with apical grey spots extended into fringe; fringe with grey basal line. Legs pale yellowish buff; foreleg, mid-leg and hind tarsus strongly marked above and on sides with dark brown but pale at articulations; outer mid-tibial spur 0·8 length of inner; outer proximal hind tibial spur 0·7 length of inner spur.

Genitalia ♂ (Fig. 84). Similar to those of *berkeleyella* (q.v.) but uncus lobes broader, flatter, the sides not deeply folded ventrad.

Genitalia ♀ (Fig. 140). Eighth tergite slightly shorter than eighth sternite, with three pairs of elongate setae at caudal margin and a medial pair of sensilla basiconica; eighth sternite almost square but flared anteriorly, with narrow medial emargination posteriorly and pair of shallow subterminal setose lobes; ostium protuberant, ventral margin slightly convex; lip of antrum with three pairs of strong setae on internal surface. Antrum elongate, more than one-half length of apophyses anteriores, very thick-walled, with coarsely rugose internal surface. Ductus bursae short, thin-walled, lined with microtrichia, extending to apices of apophyses anteriores. Corpus bursae ovoid, thin-walled, with pair of large and strongly sclerotized shark's fin-shaped signa.

Distribution. U.S.A.: California (Powell, [1968] – as *gracilis*) but possibly restricted to the Coast Range (Lawrence & Powell, 1969); Utah; Washington State; Pennsylvania (Forbes, 1923). Canada: British Columbia.

Biology. Recorded by Lawrence & Powell (1969) from a wide range of host Polyporaceae in California and recorded by Powell ([1968]) as possibly having two generations per year. Lawrence & Powell found this to be the commonest scardiine that they encountered in breeding from fungi and found it to be 'limited primarily to Polyporaceae with relatively large and persistent sporophores, or large colonies with extensive sterile tissue in species with small sporophores'.

Material examined. 37 ex.

Holotype ♀ (of *burkerella*), **U.S.A.**: Washington, Hoquiam, bred from *Tsuga heterophylla* (*Burke*) (genitalia slide no. 18654; NMNH). Holotype ♂ (of *gracilis*), **U.S.A.**: California (*Beutenmueller*) (genitalia missing) (NMNH). Holotype ♀ (of *caryophylella*), **U.S.A.**: California, Fieldbrook, 28.v.1903 (*Barber*) (abdomen missing) (NMNH). Holotype ♂ (of *errandella*), **U.S.A.**: [Washington State], (*Beutenmueller*) (abdomen missing) (NMNH).

U.S.A.: 30 ex., California, various hosts, dates and localities (genitalia slide no. 12400; BMNH; UC, Berkeley); 1 ♂, 1 ♀, Utah, Dividend, vii.1926 (BMNH). **Canada**: 1 ♂, British Columbia, Fraser Mills, 12.vii.1921 (*E.H.B.*) (genitalia slide no. 12399; BMNH).

Remarks. This is the larger and commoner of the two North American *Morophagoides* species: for differentiation from *berkeleyella* see 'Remarks' for that species. *M. burkerella* and *berkeleyella* are probably sister-groups, exhibiting close similarity in the male genitalia, notably in the modification of the juxta of both species to form a pair of elongate, almost rectangular processes, and in the reduction of the valva to a globose shape with a terminal digitate process.

Morophagoides montium (Walsingham) **comb. n.**

(Figs 14, 144)

Phycis montium Walsingham, 1914: 359. Holotype ♀, Panama (BMNH) [examined].

Adult (Fig. 14). ♀, 17 mm. Vertex and frons cream, mixed strongly with brown close to eyes. Labial palpus brown but cream at apex and articulations and on inner surface except for brown-dusted medial area on second segment. Maxillary palpus buff, brown above on basal segments, 5-segmented, extending probably no more than two-thirds length of second segment of labial palpus. Antennal scape, pedicel and basal flagellar segments dark brown, distal segments paler; cilia 0·3 × flagellar diameter. Thorax and tegula brown, slightly paler posteriorly. Forewing cream speckled with orange-brown and marked more strongly with dark brown to form a complicated cryptic pattern; dorsum generally lacking dark markings and thus conspicuously pale; fringe strongly chequered. Hindwing light brownish grey. Legs damaged but foreleg and mid-leg dull buff strongly marked above with grey-brown, pale at articulations.

Genitalia ♂. Unknown.

Genitalia ♀ (Fig. 144). Eighth tergite almost circular, as long as eighth sternite, with three pairs of elongate setae and one or two shorter setae at caudal margin, with numerous pits (?sensilla coeloconica) scattered close to caudal margin; eighth sternite forming a strongly sclerotized plate ventral to ostium, terminating caudally in a pair of lobes; each lobe with a single elongate seta and numerous smaller spine-like setae at the tip; eighth sternite hardly sclerotized anteriorly; antrum triangular, short, strongly sclerotized; inception of ductus seminalis at apex of antrum. Ductus bursae thin-walled, lined with spicular microtrichia (broken and a section missing so length uncertain). Corpus bursae thin-walled, pyriform, with a pair of shallow pocket-shaped signa that are rectangular in lateral view.

Distribution. Panama.

Biology. Unknown.

Material examined. 1 ex.

Holotype ♀, **Panama**: Volcan de Chiriqui, 2000–3000′, 1881 (*Champion*) (genitalia slide no. 15279; BMNH).

Remarks. This species is small, of comparable size to *M. nimbiferum*, but considerably smaller than *pythium* or *iulina*. Its wing pattern is not as variegated as that of *iulina* but not as uniform in the anterior half of the wing as in *pythium* or *nimbiferum*. The hindwing is darker than that of *iulina* or *pythium*. The female genitalia are distinctive, characterized by the short antrum and by the lobes ventral to the ostium being broad, situated far posteriorly, and with only a shallow emargination between them. In *pythium* the antrum is elongate, the ostium set in a deep emargination between the narrow processes of the eighth sternite; in *nimbiferum* the ostium is anterior, the processes arising caudally, and the eighth sternite strongly and complexly modified dorsal to the processes.

Walsingham's original description of *montium* was based on five specimens. One of these was expressly cited as 'Type' and two others (in NMNH) cited as paratypes. The remaining two specimens are implicitly excluded from type-status. They are, in fact, not conspecific with the holotype and are described below as new species – *pythium* and *nimbiferum*.

Morophagoides pythium sp. n.

(Figs 15, 143)

[*Phycis montium* Walsingham; Walsingham, 1914: 360. Partim – 1 ♀ only. Misidentification.]

Adult (Fig. 15). ♀, 24 mm. Vertex and frons cream, brown close to eyes. Labial palpus brown, cream at articulations; cream flecked with light brown on inner surface. Maxillary palpus pale buff flecked with brown; basal two segments strongly marked above with dark brown; 5-segmented, extending to about three-quarters length of second segment of labial palpus. Antennal scape, pedicel and basal flagellar segments dark brown above, distal segments lighter; cilia 0·5 × flagellar diameter. Thorax and tegula brown anteriorly, cream posteriorly. Forewing cream, lightly flecked with orange-brown, strongly marked with dark brown to form a cryptic 'moss-pattern' but termen, costa and dorsum less strongly marked and thus conspicuously paler; conspicuous small white subtornal spot. Hindwing pale greyish cream. Legs all wanting except foreleg – buff beneath, grey-brown above and on sides but pale at articulations.

Genitalia ♂. Unknown.

Genitalia ♀ (Fig. 143). Eighth tergite markedly longer than eighth sternite, with three pairs of strong subapical setae; eighth sternite short, folded laterally to accommodate bases of apophyses, with pair of narrow setose processes either side of ostium, folded anteriorly to ostium to form a shallow pouch. Antrum elongate, thick-walled, about one-half length of apophyses anteriores. Ductus bursae lined with microtrichia close to antrum, as long as antrum, thin-walled. Corpus bursae thin-walled, with pair of thin shark's fin-shaped signa set in sclerotized base-plates, each base-plate with and surrounded by scattered microtrichia.

Distribution. Costa Rica.

Biology. Unknown.

Material examined. 2 ex.

Holotype ♀, **Costa Rica**: Volcan de Irazu, 6000–7000′, 18— (*Rogers*) (genitalia slide no. 12383; BMNH).

Paratype. **Costa Rica**: 1 ♀, Puntarenas Prov., 6 km S. of San Vito, 2 or 5.v.1967 (*Veira*) (UC).

Remarks. With *nimbiferum* and *montium*, *pythium* forms a group of dark-patterened Neotropical species from which *iulina* is excluded by dint of its strongly variegated pattern. *M. pythium* is larger and has paler hindwings than *montium* and *nimbiferum*. The genitalia are distinctive in that the paired processes of the eighth sternite do not overly the ostium as in *montium*, are not entirely caudal to it as in *nimbiferum*, but form the lateral margins of the ostium and extend caudally. Like *nimbiferum*, the eighth tergite is considerably longer than the eighth sternite but the antrum is distinctly thicker and more elongate. Apart from *nimbiferum*, this is the only *Morophagoides* species to have microtrichia associated with the signa. *M. pythium* and *nimbiferum* may be sister-groups (synapomorphies: microtrichia in corpus bursae; eighth sternite 'shouldered' to accommodate bases of apophyses anteriores; ostium close to anterior margin of eighth sternite).

Morophagoides nimbiferum sp. n.

(Figs 16, 142)

[*Phycis montium* Walsingham; Walsingham, 1914: 360. Partim – 1 ♀ only. Misidentification.]

Adult (Fig. 16). ♀, 16 mm. Vertex and frons brownish cream, brown close to eyes. Labial palpus brown on outer surface but pale at apex and articulations; inner surface cream, small patch of brownish scales in middle of second and middle of third segment. Maxillary palpus light buff, strongly flecked above with brown, 5-segmented, reaching three-quarters length of second segment of labial palpus. Antennal scape and pedicel dark brown above, flagellum damaged and mostly lost. Thorax and tegula brown anteriorly, light buff posteriorly. Forewing cream, sparsely flecked with orange-brown, strongly marked with dark brown; however, termen, dorsum and costal spots conspicuously pale. Hindwing light grey. Legs dull buff, fore- and mid-legs dark grey-brown above and on sides but pale at articulations and across mid-tibia; outer mid-tibial spur 0·7 length of inner; outer proximal hind tibial spur 0·6 length of inner spur.

GENITALIA ♂. Unknown.

GENITALIA ♀ (Fig. 142). Eighth tergite considerably longer than eighth sternite, with three pairs of large and two pairs of small marginal setae and about 10 scattered sensilla (basiconica and (?) coeloconica); eighth sternite short, strongly folded transversely, with strongly sclerotized 'shoulders' at bases of apophyses; medially with three convergent sclerites forming a flexible blunt process overlain by a lobate membranous outgrowth of the ovipositor; paired setose processes arising caudally to ostium, strongly divergent, each bearing a pair of large setae and numerous smaller setae at apex; ostium close to anterior margin of sternite. Antrum short, thick-walled, but hardly sclerotized, less than one-quarter length of apophyses anteriores. Ductus bursae half length of apophyses, lined with microtrichia in posterior half. Corpus bursae ovoid, with pair of thorn-shaped signa set in sclerotized base-plates, each base-plate with and surrounded by scattered microtrichia.

DISTRIBUTION. Guatemala.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

Holotype ♀, **Guatemala**: Volcan de Atitlan, 2500–3500′, [xii.1880], (*Champion*) (genitalia slide no. 12385; BMNH).

REMARKS. This species is similar in size and external appearance to *montium* but the forewing pattern is less variegated. The genitalia are distinctive, however; the eighth sternite is strongly folded with elongate processes that arise posteriorly, and the ostium is close to the anterior margin, a configuration quite unlike that of any other species. Additionally, the signa differ from those of all other *Morophagoides* in being slender and thorn-like rather than laterally compressed and pocket-shaped. With *pythium*, *nimbiferum* is the only *Morophagoides* species to have microtrichia associated with the signa.

Morophagoides iulina (Walsingham) **comb. n.**

(Figs 17, 85)

Phycis iulina Walsingham, 1914: 359. Holotype ♂, GUATEMALA (BMNH) [examined].

ADULT (Walsingham, 1914: pl. 10, fig. 17 (colour); Fig. 17). ♂, 26 mm. Vertex and frons whitish, light brown close to eyes. Labial palpus pale buff speckled strongly with dark brown on first segment and on basal two-thirds of second segment. Maxillary palpus whitish, 5-segmented, elongate, extending beyond apex of second segment of labial palpus, basal three segments flecked above with dark brown. Antennal scape and pedicel buff flecked with dark brown; flagellum pale buff; cilia 2·5 × flagellar diameter. Thorax and tegula dark purple-brown with only a few whitish scales posteriorly. Forewing cream mottled with pale orange-brown; strong W-shaped dark brown mark occupying most of wing; strong dark brown costal spots; terminal spots small but extending through fringe and giving a conspicuously chequered appearance to the fringe. Hindwing slightly greyish silk-white. Mid-legs missing; fore-leg strongly marked above with dark purple-brown; hind-leg pale buff, tibial spurs damaged.

GENITALIA ♂ (Fig. 85). Saccus broadly triangular, apex rounded; uncus lobes almost semicircular, strongly folded, with conspicuously serrate inner edge. Subscaphium a broad but almost imperceptible thickening of the diaphragma. Juxta, if present, represented by a pair of shallow and inconspicuous ventral lobes at bases of valvae; transtilla represented by a pair of shallow membranous lobes dorsal to anellus. Valva simple, with subapical tuft of inwardly-directed strong spicular setae. Aedeagus about 8 × as long as broad at base, lacking carinae; vesica with minute spicular cornuti (microtrichia).

GENITALIA ♀. Unknown.

DISTRIBUTION. Guatemala.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

Holotype ♂, **Guatemala**: Totonicapam, 8500–10,500′, [viii.1880], (*Champion*) (genitalia slide no. 12398; BMNH).

REMARKS. Among the American *Morophagoides* species, *iulina* is distinguished by its pale forewing ground-colour with strong W-shaped mark; it is large, of similar size to *burkerella*, and the female could well be the largest of the genus. The male genitalia are distinguished by the serrate uncus lobes and by the characteristic modified setae on the valvae. It is the only species of *Morophagoides* that does not have a blunt subapical carina on the aedeagus.

The affinities of *iulina* are obscure. The structure of its genitalia set it well apart from the other American species of which the males are known (*berkeleyella* and *burkerella*). However, the ventral lobes at the bases of the valvae may well be homologous with the enormously developed pair of lobes (assumed to be the juxta) in these species.

MONTESCARDIA Amsel

Montescardia Amsel, 1952: 139. Type-species: *Euplocamus tessulatellus* Zeller, 1846: 178, by original designation and monotypy.

DIAGNOSIS. Antenna (male) with dorsal cilia, ventral surface scaled; cilia shorter than 1·5 × flagellar diameter. Scape with more than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; mottled coloration forming cryptic, coarse 'moss' pattern. Male with coremata in eighth abdominal segment; coremata not associated with apodemes. Male genitalia with complex uncus separated from tegumen by narrow band of membrane; tegumen broken dorsally by at least a membranous suture line; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae fused ventrally into a single movable complex, valvae without longitudinal cleft; saccus wider than long; juxta complex, entire, not divided medially; vesica lacking spicular cornuti; aedeagus with spicular or spinose carinae.

CONSPICUOUS AUTAPOMORPHIES. Juxta complex, enveloping aedeagus to form an elaborate, double-layered and partially fused intromittent complex; subscaphium broad, triangular; female with eighth tergite explanate, forming pair of broad lateral flanges (but not in *fuscofasciella*).

DISTRIBUTION. Holarctic.

BIOLOGY. See *Montescardia tessulatellus* (Zeller).

Key to species of *Montescardia*

Males (male genitalia of *fuscofasciella* are unknown)

1 Maxillary palpus elongate, reaching apex of second segment of labial palpus .... **fuscofasciella** (p. 76)
– Maxillary palpus short, only just reaching base of second segment of labial palpus 2
2 Caudal apex of juxta + aedeagus-complex fused, boat-shaped .... **tessulatellus** (p. 74)
– Caudal apex of juxta + aedeagus-complex bilobed, lobes separated by their own width **kurenzovi** (p. 75)

Females

1 Maxillary palpus elongate, reaching apex of second segment of labial palpus; posterior margin of ostium a protuberant ridge; ostium teardrop-shaped (Fig. 146) .... **fuscofasciella** (p. 76)
– Maxillary palpus short, only just reaching base of second segment of labial palpus; posterior margin of ostium not defined, eighth sternite merging into membrane of ovipositor 2
2 Eighth tergite 1·3 × or more wider than long.. **tessulatellus** (p. 74)
– Eighth tergite roughly as wide as long .... **kurenzovi** (p. 75)

Montescardia tessulatellus (Zeller)

(Fig. 18)

Euplocamus tessulatellus Zeller, 1846: 178. LECTOTYPE ♂, AUSTRIA (BMNH), here designated [examined].

Adult (Fig. 18). ♂♀, 22–29 mm. Vertex and frons straw-coloured, tufts above eyes darker. Labial palpus straw-coloured, strongly flecked with brown on outer surface of second and third segments but pale at articulations. Maxillary palpus whitish, very short, only just reaching second segment of labial palpus, 5-segmented. Antennal scape and pedicel straw-coloured, dark brown above; flagellum grey-brown above; cilia 1·0 × (♂) or 0·7 × (♀) flagellar diameter. Thorax and tegula cream, strongly flecked with brown. Forewing cream, marked with orange-brown along veins and strongly flecked with dark brown to form ill-defined jagged medial and postmedial bands; medial costal spot strongly defined; strong dark spot at end of cell. Hindwing pale grey, mottled at margin and fringe. Legs straw-coloured, fore-, mid- and hindlegs strongly marked above and on outer surfaces with dark brown, but pale at articulations; outer mid-tibial spur 0·6 length of inner; outer proximal hind tibial spur 0·7 length of inner spur.

Genitalia ♂ (Petersen, 1957: fig. 242, pl. 12, figs 1, 2; Zagulajev, 1973: figs 16A, 80, 81). Saccus short, triangular; uncus lobes strongly sclerotized, separated from tegumen by relatively broad membranous area, setose only apically and laterally, with irregularly serrate caudal margin. Subscaphium triangular. Juxta enveloping and partly fused with aedeagus to form an elaborate intromittent complex; transtilla not developed. Valvae fused ventrally to form a united complex with a narrowly V-shaped medioventral emargination; apices of valvae simple, rounded. Aedeagus fused with juxta to form intromittent complex; vesica without cornuti.

Genitalia ♀ (Petersen, 1957: fig. 243; Zagulajev, 1973: figs 82, 83). Eighth tergite longer than eighth sternite, caudal one-quarter membranous, with four pairs of strong and elongate subapical setae posterior to irregular margin of sclerotization and with about six scattered pairs of sensilla basiconica; tergite explanate anteriorly to form conspicuous pair of quadrate lateral flaps; eighth sternite U-shaped, bases of arms of 'U' strongly folded, between arms a broad and deep depression leading to ostium which is overlain by a strong semicircular sclerite. Antrum short, longitudinally folded and with very fine transverse striations; inception of ductus seminalis at anterior end of antrum. Ductus bursae thick-walled, slightly longer than antrum. Corpus bursae large, ovate, extending well beyond apices of apophyses anteriores; signa absent.

Distribution. Sweden; Norway; Finland (Krogerus *et al.*, 1971); Italy (Petersen & Gaedike, 1979); Sardinia (Amsel, 1952); central Europe including East and West Germany; Yugoslavia; Austria; Rumania; Hungary; Czechoslovakia; Poland; U.S.S.R. (European Region, Crimea, E. Siberia, Primorsk region); Mongolia.

Biology. Petersen (1969) has recorded this species from pore-fungi and from dead wood of *Picea* and *Fagus*.

Material examined. 82 ex.

Lectotype ♂, [**Austria**]: Semm[e]ring [approx. 80 km. SW. of Vienna], vi (*Mann*) (BMNH).

Poland: 1 ♀ (paralectotype), [approx. 15 km W. of Klodzkol] 'Sfd' ['between Reinerz and the Seefelder'], 29.vii (*Zeller*) (BMNH). 80 ex., various localities (see 'Distribution') (BMNH; ZI). (For details of ZI holdings see Zagulajev (1973).)

Remarks. This species is characteristically patterned and, with its geographical context, should be identifiable without recourse to dissection. Unlike all other Palaearctic scardiines with this wing-pattern, all veins in the forewing are free and the forewing appears correspondingly broader than in, say, *Morophaga* (but beware of *Morophagoides iranensis*, worn specimens of which might be mistaken for *Montescardia*). Unlike most other scardiines, the hind tarsus in *Montescardia* is dark brown above, the pattern broken by pale scaling at the articulations. In the female, the eighth tergite is deeply recessed into the intersegmental membrane, forming a well-defined dorsal pouch with a strongly microtrichiate dorsal internal surface. This species and *M. kurenzovi* may be separated from the North American *fuscofasciella* by their having very short maxillary palpi: in *fuscofasciella* the palpi would, if unfolded, reach the apex of the second segment of the labial palpus. Separation of *tessulatellus* and *kurenzovi* is more problematical: the latter taxon is probably no more than a slight geographical variant of *tessulatellus* from the edge of its range. However, further material of *kurenzovi* is required to clarify its status. It may be tentatively separated from *tessulatellus* using the characters described in the key and below.

Montescardia kurenzovi (Zagulajev) **comb. n.**

Scardia kurenzovi Zagulajev, 1966: 637. Holotype ♂, U.S.S.R. (ZI) [examined].

Adult. ♂♀, 21·5–23·5 mm. Coloration and external structure similar to *tessulatellus*.

Genitalia ♂ (Zagulajev, 1966: fig. 2A; Zagulajev, 1973: figs 15A, 15b, 16B, 84). Similar to those of *tessulatellus* but apex of juxta-aedeagus complex with pair of separated lobes.

Genitalia ♀ (Zagulajev, 1966: figs 2b, 2B; Zagulajev, 1973: figs 17A, 17b, 19A, 85, 86). Similar to those of *tessulatellus* but eighth tergite not as broadly explanate, outer corners of tergite acute.

Distribution. U.S.S.R. (Maritime Territory); Kurile Is (Kunashir) (Zagulajev, 1973).

Biology. Unknown.

Material examined. 5 ex.
Holotype ♂, **U.S.S.R.**: Maritime Territory, Khasan district, Verkhnyaya Sidimi, 8.vi.1950 (*Zagulajev*) (ZI).
U.S.S.R.: 1 ♀ (paratype), data as holotype but nr Vladivostok, 8.iv.1956 (*Omelko*); 1 ♀ (paratype), data as holotype but Suchan, source of the Sitsa River, 28.viii.1928 (*Kurentsov*) (ZI); 1 ♀, data as first paratype but 24.vii.1950 (*Zagulajev*) (ZI); 2 ♀, Kurile Is., Kunashir, 5–7.vii.1962 & 6.vii.1964 (*Krivolutskaya*) (ZI – only one specimen present when examined by author).

Remarks. It is unlikely that this taxon represents a good species (see 'Remarks' for *tessulatellus*); the differences between it and *tessulatellus* are subtle in the extreme. The BMNH collection contains a male *Montescardia* from Khabarovsk ('Chabarovsk') on the Amur River. This locality is at the edge of the geographical range of *kurenzovi* as recorded by Zagulajev (1973) and well beyond the eastern limit of *tessulatellus* recorded by the same author. However, this specimen is an entirely typical example of *tessulatellus*.

Montescardia fuscofasciella (Chambers) comb. n.

(Figs 19, 146)

Euplocamus (?) fuscofasciella Chambers, 1875: 257. LECTOTYPE ♀, U.S.A. (MCZ), here designated [examined].

Scardia pravatella Busck, 1908: 94. Holotype ♂, U.S.A. (NMNH), here designated [examined]. [Synonymized by Davis (1983: 5).]

Adult (Fig. 19). ♀, 27 mm. Vertex and frons pale buff. Labial palpus off-white, strongly flecked with brown on outer surface. Maxillary palpus cream, flecked with brown above on basal segments, elongate, 5-segmented, reaching apex of second segment of labial palpus. Antennal scape, pedicel and basal flagellar segments dark brown above; flagellum medium brown; cilia 0·6 × (♀) flagellar diameter. Thorax and tegula speckled brown and cream. Forewing brownish cream, ill-definedly orange-brown along veins, strongly speckled with dark brown to form strong solid blotches and a well-defined medial transverse fascia. Hindwing light grey-brown, ill-defined paler mottling at apex. Legs greyish buff, fore- and mid-legs strongly marked above with dark brown but pale at articulations; hind tarsus also dark brown above but articulations pale; outer mid-tibial spur 0·4 length of inner; outer proximal hind tibial spur 0·5 length of inner spur.

Genitalia ♂. Unknown.

Genitalia ♀ (Fig. 146). Eighth tergite markedly longer than eighth sternite, with three or four pairs of strong subapical setae; eighth sternite moulded round large pyriform ostium, apex emarginate, laterocaudal lobes each with pair of strong setae. Antrum very short, dorsal wall rugose; inception of ductus seminalis almost at level of ventral margin of ostium. Ductus bursae broad, with lepidote (?microtrichiate) inner surface, merging with elongately ovate corpus bursae. Corpus bursae thin-walled, extending slightly anteriorly beyond apophyses anteriores; signa absent.

Distribution. U.S.A. (Kentucky (?), Pennsylvania, North Carolina, Texas (?)).

Biology. Unknown.

Material examined. 3 ex.
Lectotype ♀ (of *fuscofasciella*), **U.S.A.**: 'Kentucky' [but more probably Texas – see 'Remarks'] (*Chambers*) (genitalia slide no. 2563 [Davis]; MCZ). Holotype ♂ (of *pravatella*) (abdomen missing), **U.S.A.**: Pennsylvania, New Brighton, 23.viii.1902 (*Merrick*) (NMNH).
U.S.A.: 1 ex. (abdomen missing), North Carolina, 1884 (*Morrison*) (BMNH).

Remarks. Distinguished from its congeners by its elongate maxillary palpus, *fuscofasciella* is a distinctly dark, speckly species somewhat reminiscent of *Morophaga morellus*. Apart from *Morophagoides bur-*

kerella it is the only North American scardiine of this size and wing-pattern. In *burkerella* the thorax and the apices of the tegulae are cream, not with mixed brown and cream scales, and the hindwing is pale cream with a slight greyish tint, considerably paler than the light grey-brown hindwing of *fuscofasciella*.

The female genitalia are very different from those of *tessulatellus*; the eighth tergite is not explanate, the inner surface of the ductus bursae is lepidote, and the shape of the eighth sternite is markedly different. The structure of the male genitalia, presently unknown, may prove *fuscofasciella* not to be a *Montescardia*. Its present placement should be considered provisional.

Chambers (1875: 258) refers to 'the foregoing descriptions of "Teneina [sic] from Texas" . . . the conclusion of a series'. The block of descriptions of Texan material appears to begin on p. 250 with *Gelechia saphirinella* and to include *fuscofasciella*. Although the lectotype is labelled 'Kentucky', the label is not by Chambers and may be erroneous. The type-locality must remain in question as the distribution of this species is hardly known.

BYTHOCRATES Meyrick

Bythocrates Meyrick, 1919: 268. Type-species: *Bythocrates drosocycla* Meyrick, 1919: 268, by monotypy.

DIAGNOSIS. Antenna (male) with dorsal cilia, ventral surface scaled; cilia shorter than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus with fewer than 5 segments; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_3 and CuA_1 stalked or very closely approximated at base; mottled coloration forming cryptic, coarse 'moss' pattern. Male lacking coremata in eighth abdominal segment. Male genitalia with simple uncus – a pair of setose lobes – separated from tegumen by narrow band of membrane; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae fused ventrally into a single movable complex, valvae without longitudinal cleft; saccus wider than long; juxta simple, entire, not divided medially; vesica with spicular cornuti; aedeagus smooth-surfaced, without spicular carinae.

CONSPICUOUS AUTAPOMORPHIES. Valvae entirely fused ventrally, with no trace of a suture line (line of fusion also difficult to discern in some species of *Daviscardia*); corpus bursae of female with four strongly sclerotized, pocket-shaped (or wedge-shaped) signa; ductus bursae with oblique regular constrictions; female eighth tergite entirely divided medially.

DISTRIBUTION. Neotropical region – Guyana, Trinidad.

BIOLOGY. Has been bred from *Polyporus* in Trinidad (label data).

Bythocrates drosocycla Meyrick

(Figs 20, 145)

Bythocrates drosocycla Meyrick, 1919: 268. Holotype ♂, GUYANA (BMNH) [examined].

ADULT (Clarke, 1970: pl. 16, figs 1, 1b; Fig. 20). ♂, 11 mm; ♀, 14 mm. Vertex and frons dull buff. Labial palpus dark brown but pale buff on inner surface of second segment. Maxillary palpus buff-cream, a few dark brown scales above close to base, short, 4-segmented, extending only to basal one-fifth of second segment of labial palpus. Antennal scape and pedicel dull buff, flagellum dark brown; cilia 1·0 × (♂) or 0·7 × (♀) flagellar diameter. Thorax and tegula dark brown. Forewing purple-brown with very slightly darker mottling forming an indistinct 'moss' pattern; costa with six or seven inconspicuous paler yellowish spots; termen with interrupted line of yellowish spots. Hindwing purple-brown. Legs dull buff; outer mid-tibial spur 0·5 length of inner; outer proximal hind tibial spur 0·6 length of inner spur.

GENITALIA ♂ (Clarke, 1970: pl. 16, figs 1c–1e). Saccus shallow, triangular; uncus lobes slender, elongate, digitiform, widely separated. Subscaphium strongly sclerotized, shuttle-shaped. Juxta not identified; transtilla forming V-shaped arch between costae of valvae. Valvae fused; valval complex elongate, strongly sclerotized and setose at apex, with transverse ridge at three-quarters and pair of oblique sclerotized bars at one-half, these fused with transtilla. Aedeagus short, broad and stumpy, only 4 × as long as broad, smooth-surfaced; vesica with minute spicular cornuti (microtrichia).

GENITALIA ♀ (Fig. 145). Eighth tergite divided medially, slightly longer than eighth sternite, with three pairs of stout terminal bristles; eighth sternite deeply folded transversely to form a triangular sterigma with strongly sclerotized truncated apex overlying ostium and bearing pair of elongate setae plus single (?supernumerary) seta and a few scattered sensillae (?basiconica). Antrum not developed. Ductus bursae as long as apophyses anteriores, thin-walled, lined anteriorly with granular microtrichia from inception of ductus seminalis (at twice length of eighth sternite from ostium), oblique constrictions forming a characteristic pattern. Corpus bursae ovate, posterior half with regular transverse constrictions, thin-walled, with four stout, wedge-shaped and finely spinose signa.

DISTRIBUTION. Guyana, Trinidad.

BIOLOGY. Specimens have been reared from *Polyporus* in Trinidad.

MATERIAL EXAMINED. 3 ex.
Holotype ♂, **Guyana**: Bartica, ii.1913 (*Parish*) (genitalia slide no. JFGC 6639; BMNH).
Trinidad: 1 ♂, 1 ♀, reared from *Polyporus*, 1922 (*Urich*) (genitalia slide nos 1664, 13110; BMNH).

REMARKS. This small, dark species may be recognized simply by its external appearance: it bears a slight resemblance to *Diataga* but is smaller, darker and broader-winged. Forewing veins R_3 and R_4 are separate, unlike *Diataga*. Both male and female genitalia are distinctive, the male in that the valvae are strongly fused and the elongate uncus lobes are widely separated, and the female in that it is the only scardiine with more than two signa.

DAVISCARDIA gen. n.

Type-species: *Scardia coloradella* Dietz, 1905: 25.

DIAGNOSIS. Antenna (male) lacking dorsal cilia, ventral surface without scales; cilia longer or shorter than 1·5 × flagellar diameter. Scape with more than 15 pecten bristles. Interocular index (male) greater than 1·0. Maxillary palpus with fewer than 5 segments; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; pattern consisting of pale termen and dorsum on darker ground-colour. Male lacking coremata in eighth abdominal segment. Male genitalia with complex uncus fused with tegumen; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva forming ventral hook or hooks, or with spines; valvae fused ventrally into a single movable complex, valvae without longitudinal cleft; saccus wider than long; juxta, if present, fused with valvae and not recognizable as such; vesica with spicular cornuti; aedeagus smooth-surfaced, without carinae, but minute spicular carinae present in two species.

CONSPICUOUS AUTAPOMORPHIES. None; however, this is the only group of species with a pale apex and dorsum in the forewing which lacks coremata; the deep, almost box-like fused valvae are also characteristic.

DISTRIBUTION. Neotropical region; Nearctic region – U.S.A. (southern states).

BIOLOGY. See *Daviscardia coloradella* (Dietz).

Key to species of *Daviscardia*
Males (males of *hypocritella* and *lupulella* are unknown)

1 Tegumen with caudally-directed lateral digitate processes 2
– Tegumen not produced laterocaudally 6
2 Tegumen with two pairs of caudally-directed processes (Fig. 95) .... species A (p. 84)
– Tegumen with single pair of caudally-directed processes 3
3 Aedeagus slender, about 20 times as long as broad, with four or five small cornuti (Fig. 94) **bicolorella** (p. 84)
– Aedeagus stout, about 10 times as long as broad, with very many spicular cornuti 4
4 Processes of tegumen triangular; apex of saccus pointed (Fig. 93) .... **mackiei** (p. 83)
– Processes of tegumen elongately triangular with extended apex; apex of saccus rounded 5
5 Uncus lobes simple, flap-like; outer surface of valva with shallow ridge; aedeagus with spicular carinae on ventral surface (Fig. 89) .... **luctuosa** (p. 82)
– Uncus lobes with triangular anterior process; outer surface of valva smooth; aedeagus smooth-surfaced 7
6 Valvae extended ventrally and caudally to form a pair of hand-shaped processes (Fig. 87) **coloradella** (p. 79)

– Valvae extended ventrally and caudally in a single, fused, irregularly-shaped process (Fig. 91) ***radulella*** (p. 80)

7 Uncus lobe with minute triangular internal (anterior) process; setae of valvae spine-like; medioventral emargination between valvae extending to one-third their length (Fig. 92) ***beckeri*** (p. 81)

– Uncus lobe with large triangular internal (anterior) process; setae of valvae thin and hair-like; medioventral emargination between valvae extending to one-half their length (Fig. 90) ***bimendella*** (p. 81)

Females (females of *bimendella, bicolorella, radulella* and species A are unknown)

1 Bursa copulatrix with fine spicular signa 2

– Bursa copulatrix without spicular signa (but spicular microtrichia may be present in the antrum) 3

2 Spicular signa arranged in an equatorial band (Fig. 148) .... ***beckeri*** (p. 81)

– Spicular signa arranged in a pair of opposed T-shaped clusters (Fig. 150) .... ***mackiei*** (p. 83)

3 Ductus bursae elongate and narrow, corpus bursae spherical; ventral margin of ostium transverse, with deep and narrow medial emargination (Fig. 151) .... ***hypocritella*** (p. 86)

– Ductus bursae very short, corpus bursae elongately pyriform; ventral margin of ostium a pair of lobes 4

4 Emargination between lobes that form ventral margin of ostium broadly U-shaped; ductus bursae with sclerotized lateral patches anterior to inception of ductus seminalis (Fig. 147) ***coloradella*** (p. 79)

– Emargination between lobes that form ventral margin of ostium narrowly V-shaped; ductus bursae without sclerotization anterior to inception of ductus seminalis (Fig. 149) ***lupulella*** (p. 85)

Daviscardia coloradella (Dietz) **comb. n.**

(Figs 21, 86–88, 147)

Scardia coloradella Dietz, 1905: 25. LECTOTYPE ♂, U.S.A. (MCZ), here designated [examined on author's behalf by D. R. Davis].
Fernaldia coloradella (Dietz) Davis, 1983: 5.

ADULT (Fig. 21). ♂♀, 26–33 mm. Vertex whitish, frons brownish yellow. Labial palpus grey-brown, paler on inner surface, whitish at base and apex of terminal segment. Maxillary palpus light grey-brown, short, 3-segmented. Antennal scape, pedicel and flagellum dark brown; cilia 2·3 × (♂) or 0·5 × (♀) flagellar diameter. Thorax whitish flecked with brown; tegula whitish, brown anteriorly. Forewing purple-brown, paler spots along costa, with continuous whitish posterior and terminal fascia strongly flecked with purple-brown and tinged with orange-brown posteriorly; pair of conspicuous dark spots at apices of R_3 and R_4; brown flecks coalescing at tornus and fringe; posterior margin of dark fascia strongly sinuate. Hindwing very light brownish grey. Legs greyish buff, hindlegs paler, foreleg and mid-leg grey brown above but pale at articulations; outer mid-tibial spur 0·5 length of inner; outer hind proximal tibial spur 0·6 length of inner spur.

GENITALIA ♂ (Figs 86–88). Saccus shallow, almost square; uncus lobes very short, widely separated, but fused basally, each with setose ventral lobe bearing short triangular process with three or four stiff bristles; uncus lobes setose but strongly sclerotized, each with pair of spinose setae close to apex. Tegumen produced laterocaudally to form pair of rounded 'shoulders'. Subscaphium not developed. Juxta, if developed, fused with valvae and not recognizable but possibly forming caudally-directed hand-shaped process. Valva sinuate, fused with medial pair of hand-shaped processes, apex with dorsal ridge and chisel-shaped ventral tip. Aedeagus stout, 8 × as long as broad at middle, without carinae; vesica with numerous strong, spicular cornuti.

GENITALIA ♀ (Fig. 147). Eighth tergite longer than eighth sternite, with five pairs of stout subapical setae and two or three very small marginal setae, with scattered pits anterior to large setae; eighth sternite deeply folded to accommodate broad ostium, ventral margin of ostium with pair of large lobes, each bearing a pair of stout subapical setae and numerous smaller apical and subapical setae. Antrum broadly funnel-shaped, inception of ductus seminalis at apex of 'funnel' just beyond anterior margin of eighth sternite. Ductus bursae and corpus bursae contiguous, posteriorly with sclerotized region on left and irregularly-margined and more strongly sclerotized patch on right, wall between these patches with microtrichia; medial region thick-walled, anterior region ovoid, signa absent.

DISTRIBUTION. U.S.A. (Colorado, Arizona, Utah, New Mexico, Maine; Texas – Dietz, 1905); Mexico (Durango – Powell, [1968]; Lawrence & Powell, 1969).

BIOLOGY. Reared from fungus on *Pseudotsuga*, from *Polyporus* on *Pinus* and from *Ganoderma* on *Populus* in the U.S.A., and from *Ganoderma* on *Quercus* in Mexico (Lawrence & Powell, 1969).

MATERIAL EXAMINED. 7 ex.

Lectotype ♂, **U.S.A.**: Colorado, Durango, 9.xii.1899 (*Dietz*) (MCZ).

U.S.A.: 1 ♂ (paralectotype), New Mexico, Beulah, end of viii. (genitalia slide no. 12387; BMNH); 1 ex., Maine, Lincoln Co., 3 m. SE. Demariscotta, 14.vii.1969 (*Powers*) (UC); 1 ♀, Arizona, Cochise Co., upper Miller Canyon, Huachuca Mts, 6–7000′, 9.viii.1974 (*D. & J. Powell*) (BMNH); 1 ♀, Arizona, Redington (BMNH); 2 ♀, Arizona, Huachuca Mts, 27.ix.1903 (*Oslar*) (genitalia slide no. 12388; BMNH); 1 ♀, Utah, Wasatch Co., 7 m. E. of Springville, 6000′, 28.vii.1968 (*Doyen*) (BMNH).

REMARKS. This is the only *Daviscardia* species known to occur north of Mexico. It is larger than all other known species, the pale forewing fascia is more strongly speckled with brown, and the antennal cilia of the male are the longest of the genus, approached only by those of an unnamed species from Mexico (see below). The male genitalia are distinctive in that the tegumen does not bear the laterocaudal processes that are present in all other species except *radulella*; the valvae are produced ventrally to form a pair of hand-shaped lobes. These lobes may be homologous with the irregular, quadrate mediocaudal process between the valvae of *radulella* and with the hemicylindrical structure in the same position in *bicolorella*. By analogy with other genera, it seems likely that the juxta is implicated in these structures but that it is closely fused with the ventrobasal region of each valva and is not recognizable. However, in several species (for example, *mackiei*) there is no trace of any specialization at the ventral margin of the valva, and the juxta is either entirely subsumed into the valval complex or else has been lost. For the purpose of scoring character-states for numerical analysis, the juxta in *Daviscardia* is interpreted as primitively present and modified into a complex structure.

The female genitalia of *coloradella* are distinctive in their size, the presence of two sclerotized patches at the posterior end of the ductus bursae, and the deep U-shaped medial emargination of the ventral lip of the ostium.

I am unable to formulate a hypothesis of phylogeny for *Daviscardia*. However, two groups of species are recognizable – *coloradella* + *radulella* (with specialized ventral process(es) at the base(s) of the valvae, possibly derived from the juxta, and with the tegumen lacking laterocaudal processes) and all remaining species (with laterocaudal processes from the tegumen). Of the latter group, *bicolorella* has a ventral process between the valvae possibly homologous with that of *radulella*.

The identity of Mexican specimens, left in some doubt by Powell ([1968]), has not been confirmed.

***Daviscardia radulella* sp. n.**

(Figs 22, 91)

ADULT (Fig. 22). ♂, 16 mm. Coloration and external structure similar to *bimendella* (see below) but vertex and frons pale yellow-ochre; antennal flagellum light greyish brown above; cilia 1·0 × flagellar diameter; thorax and tegula brown, thorax flecked with brownish cream. Forewing with narrow posterior cream fascia continuous with terminal fascia but almost broken at tornus; distal margin of anterior brown fascia strongly concave; costa with about eight cream flecks, two basal pairs of these coalesced and extended posteriorly to form conspicuous spots; terminal fascia with large brown spots between R_3 and R_5 and between M_1 and M_2. (All legs badly damaged or missing.)

GENITALIA ♂ (Fig. 91). Saccus rounded, with slightly angled apex; uncus lobes very shallow, simple, widely separated, fused basally, ventral lobe little more than a ridge. Tegumen not extended laterocaudally. Subscaphium represented by thickening of diaphragma, with spatulate anterior end. Juxta, if developed, fused with valvae and not recognizable but possibly forming irregularly quadrate ventral process between arms of valvae; transtilla not developed. Valva simple, with small and thorn-like apical and subapical processes. Aedeagus stout, about 10 × as long as broad in middle, lacking carinae; vesica with numerous stout spicular cornuti.

GENITALIA ♀. Unknown.

DISTRIBUTION. Costa Rica.

BIOLOGY. Unknown.

Material examined. 1 ex.
Holotype ♂, **Costa Rica**: Palo Verde, 5250′, 1920 (genitalia slide no. 12386; BMNH).

Remarks. A small, speckly species, *radulella* may be recognized by the uniform head vestiture, short antennal cilia and marked extension of the dark forewing fascia towards the tornus. The male genitalia are distinctive in that there are no processes from the tegumen (as in *coloradella* – q.v.) and there is an irregularly quadrate ventral process between the bases of the valvae.

The holotype was originally identified by Meyrick in his collection as 'Cranaodes iulina Wals.'.

Daviscardia bimendella (Zeller) **comb. n.**

(Figs 23, 90)

Tinea bimendella Zeller, 1863: 143. LECTOTYPE ♂, Venezuela (BMNH), here designated [examined].

Adult (Zeller, 1863: pl. 2, fig. 5; Fig. 23). ♂, 22 mm. Vertex white, frons brown. Labial palpus brown, whitish at articulations, apex, and on inner surface of first and second segments. Maxillary palpus brownish, very short, 3-segmented. Antennal scape and pedicel brown; flagellum ochreous; cilia 1·7 × flagellar diameter. Thorax and tegula whitish, anterior half of tegula brown. Forewing purple-brown with extensive continuous terminal and posterior whitish fascia flecked with brown; some orange-brown scales close to posterior margin at one-half; costa with large basal and smaller medial white spot. Hindwing off-white, diffusely flecked with grey at apex. Legs pale buff; foreleg strongly marked with dark brown above; mid-legs missing; outer proximal hind tibial spur 0·6 length of inner spur.

Genitalia ♂ (Fig. 90). Saccus short, rounded; uncus lobes very short, widely separated and apparently not fused basally, each with pendulous ventrally-directed lobe bearing subapical triangular process. Tegumen produced caudally to form pair of lateral digitate processes. Subscaphium defined but only recognizable at spatulate anterior end. Juxta either not developed or entirely fused with valvae and unrecognizable. Valva simple, with shallow spine on terminal margin and with spined apex. Aedeagus stout, 10 × as long as broad in middle, lacking carinae; vesica with numerous strong, spicular cornuti.

Genitalia ♀. Unknown.

Distribution. Venezuela.

Biology. Unknown.

Material examined. 1 ex.
Lectotype ♂, **Venezuela** (genitalia slide no. 13124; BMNH).

Remarks. *D. bimendella*, with *beckeri*, *luctuosa*, *mackiei*, species A and *radulella*, forms a group of externally very similar species. With the much larger *coloradella*, *beckeri*, and the unnamed species from Mexico, it is conspicuous in having the male antennal cilia longer than 1·5 × the diameter of the flagellar segments; however, the male antenna of *luctuosa* is unknown. As in *coloradella*, *beckeri*, *luctuosa* and *mackiei*, the scales of the frons and vertex are of contrasting shades, the vertex whitish and the frons brownish. It may be separated from *beckeri*, *luctuosa* and *mackiei* by the broader pale terminal fascia in the forewing and by the large pale basicostal spot. This spot, although present in *mackiei*, is suffused with purple-brown in that species.

The male genitalia are very similar to those of *luctuosa* but each valva has a pair of terminal thorn-like projections and the uncus lobes each bear a triangular medioventral process; these are absent in *luctuosa*. The aedeagus is smooth-surfaced but in *luctuosa* it bears numerous minute spicular carinae. The male genitalia resemble even more those of *beckeri* but differ in that the armature is larger, the tegumen processes are broader and not as strongly pointed, and the free arms of the valvae are more elongate. The triangular medioventral process on each uncus lobe is hardly developed in *beckeri*.

Meyrick misidentified a male of *mackiei* and the holotype female of *hypocritella* as 'Cranaodes bimendella' in his collection.

Daviscardia beckeri **sp. n.**

(Figs 24, 25, 92, 148)

[*Phycis luctuosa* Walsingham, 1914: 358. Partim – 2 ♀ only. Misidentification.]

Adult (Figs 24, 25). ♂♀, 14–21 mm. Coloration and external structure similar to *bimendella* but frons light brown, inner surface of third segment of labial palpus greyish (white in one female from Mexico), antennal flagellum grey-brown, cilia 2·0 × (♂) or 0·4 × (♀) flagellar diameter; forewing costa with a few ill-defined paler flecks; hindwing light grey in females; outer mid-tibial spur 0·35 length of inner; outer proximal hind tibial spur 0·6 length of inner spur.

Genitalia ♂ (Fig. 92). Similar to those of *bimendella* but genital armature smaller, only about 1·05 mm long (about 1·30 mm in *bimendella*); uncus lobes not as elongate, subapical triangular process on each lobe very small and insignificant. Subscaphium well defined only at slightly spatulate anterior end, ribbon-like. Ventral emargination between valvae infilled to two-thirds by membranous 'bridge' (only to one-half in *bimendella*); setae of valvae stout and spine-like.

Genitalia ♀ (Fig. 148). Eighth tergite as long as eighth sternite, with three or four pairs of strong subapical setae and numerous terminal and subterminal pits; eighth sternite with lamellate surface and only slightly sclerotized dorsal to ostium, ventral lip of ostium m-shaped, lobes each bearing one pair of large setae and numerous small setae. Antrum with nodular/microtrichiate internal surface, terminating in strongly sclerotized colliculum well beyond margin of eighth sternite. Ductus bursae short, thin-walled, inception of ductus seminalis at junction with corpus bursae. Corpus bursae pyriform (but exaggeratedly so), posterior end sclerotized, sclerotization terminating anteriorly in equatorial band of spicular signa; corpus swollen anterior to signa, membrane thick-walled and finely reticulate, becoming thin-walled and smooth-surfaced in globular anterior region.

Distribution. Mexico; Costa Rica.

Biology. Unknown.

Material examined. 6 ex.

Holotype ♂, **Costa Rica**: Turrialba, 600 m, iii.1973 (*Becker*) (genitalia slide no. 9492; BMNH).

Paratypes. 1 ♂, 1 ♀, data as holotype, x.1971 and iii.1973 (coll. V. O. Becker, Brasilia); 1 ♀, data as holotype, x.1971 (genitalia slide no. 9493; BMNH).

Excluded from paratype series. **Mexico**: 2 ♀, Vera Cruz, Jalapa, 4500′, 1887 (*Schaus*; *Trujillo*) (genitalia slide no. 13126; BMNH).

Remarks. This species, similar to *bimendella*, *luctuosa* and *mackiei*, is difficult to recognize by external characteristics. It may be distinguished from *mackiei* by its considerably longer antennal cilia in the male, and from *bimendella* by the darker costal region of the forewing and the greater extension in the tornal region of the dark forewing fascia. The outer mid-tibial spur is shorter in *beckeri* than in *luctuosa* or *mackiei* (0·35 as opposed to 0·50 the length of the inner spur). The male genitalia are distinguished from those of *bimendella* as described above.

The female genitalia are very similar to those of *mackiei* but the spicular signa are in an equatorial band, not in a pair of opposed T-shaped clusters, and *mackiei* has no posterior sclerotized patch on the corpus bursae.

It is questionable whether the two females from Mexico are conspecific with the type-series. The genitalia of one specimen have been dissected (the other has the abdomen missing) and are illustrated (Fig. 148). In comparison with the dissected female from Costa Rica, there are only five strong setae on the eighth tergite (i.e. two pairs plus one supernumerary) whereas there are three pairs plus one in the Costa Rican specimen. The antrum is only very weakly sclerotized, the posterior region of the corpus bursae has only an irregular sclerotized patch, the shape of the corpus bursae is substantially different, and there is no reticulation of the membrane anterior to the signa. However, the Mexican specimen has mated whereas the Costa Rican example is virgin; this may account for the differences in the structure and thickness of the membrane of the corpus bursae and for the difference in its shape.

Daviscardia luctuosa **(Walsingham) comb. n.**

(Figs 26, 89)

Phycis luctuosa Walsingham, 1914: 358. LECTOTYPE ♂, Costa Rica (BMNH), here designated [examined].

Adult (Fig. 26). ♂, 20 mm. Coloration and external structure similar to *bimendella* but frons light brown, inner surface of labial palpus pale greyish; (antennae broken). Forewing pattern similar to *bimendella*, but tornal region of pale fascia narrower as distal margin of dark fascia is expanded towards tornus; pale costal spots (particularly basal spot) smaller than in *bimendella* and suffused with purple-brown; outer mid-tibial spur 0·5 length of inner; outer proximal hind tibial spur 0·6 length of inner spur.

Genitalia ♂ (Fig. 89). Similar to those of *bimendella* but uncus lobes more widely separated, ventral lobe shorter and without triangular process; lateral processes of tegumen broader basally; valva with free caudal region more elongate, outer surface swollen and slightly ridged, spine on terminal margin represented only by slight irregular swelling; aedeagus similar to that of *bimendella* but ventral surface with numerous minute spicular carinae.

Genitalia ♀. Unknown.

Distribution. Costa Rica.

Biology. Unknown.

Material examined. 1 ex.
Lectotype ♂, **Costa Rica**: Volcan de Irazu, 6–7000′, 18— (*Rogers*) (genitalia slide no. 13129; BMNH).

Remarks. This species is similar to *bimendella* (see 'Remarks', above) but the terminal pale forewing fascia is narrower and the pale costal spots much smaller. The male genitalia differ as described for *bimendella*.

The external similarity of *luctuosa* and its allies is such that Walsingham's syntype series of this species included the male and (provisional) female of *mackiei* as well as the (holotype) female of *lupulella* and two females of *beckeri*, and the holotype of *Moscardia varna*.

***Daviscardia mackiei* sp. n.**

(Figs 27–29, 93, 150)

[*Phycis luctuosa* Walsingham, 1914: 358. Partim – 1 ♂, 1 ♀ only. Misidentification.]

Adult (Figs 27–29). ♂, 18, 19 mm; ♀, 16 mm. Coloration and external structure similar to *bimendella* and *luctuosa* but antennal cilia 1·3 × (♂) flagellar diameter (antennae of ♀ broken). Forewing pattern similar to *luctuosa* but pale costal spots larger, resembling more those of *bimendella*, but suffused with purple-brown as in *luctuosa*; female with purple-brown fascia extended towards tornus, reaching posterior margin and extending into fringe.

Genitalia ♂ (Fig. 93). Saccus shallowly triangular; uncus lobes very short, widely separated, but fused basally to form a kidney-shaped complex, each with pendulous setose ventral lobe bearing shallow subapical triangular process; uncus lobes setose but strongly sclerotized. Tegumen produced caudally to form pair of lateral triangular blunt-tipped processes. Subscaphium not developed. Juxta, if present, fused with valvae and not recognizable; transtilla possibly represented by thickened band across diaphragma between bases of valvae. Valva simple, lobate, apex with strong internal ridge terminating in shallow pyramidal process. Aedeagus stout, 8 × as long as broad at middle, without carinae; vesica with numerous strong spicular cornuti.

Genitalia ♀ (Fig. 150). Eighth tergite longer than eighth sternite, with three pairs of strong subapical setae and a few scattered pits in posterior half; eighth sternite with lamellate surface and only slightly sclerotized dorsal to ostium, ventral lip of ostium m-shaped, lobes each bearing one pair of large setae and numerous small setae. Antrum with nodular/microtrichiate internal surface, terminating in colliculum well beyond margin of eighth sternite. Ductus bursae short, thin-walled, inception of ductus seminalis at junction with corpus bursae. Corpus bursae elongately pyriform, sparsely microtrichiate just anterior to inception of ductus seminalis, with strongly sclerotized subequatorial band bearing numerous dense and strong spicular signa arranged in two opposed inverted T-shaped clusters; membrane adjacent to these clusters with regular honeycomb-like reticulation.

Distribution. (?)Guatemala; Colombia; Bolivia.

Biology. Unknown.

Material examined. 3 ex.
Holotype ♂, **Bolivia**: Yungas de la Paz, 1908 (*Seebold*) (genitalia slide no. 12393; BMNH) (paralectotype of *luctuosa*).
Paratype. **Colombia**: 1 ♂, La Crumbre, 6600′, v.1914 (*P.*) (genitalia slide no. 12391; BMNH).
Excluded from paratype series. **Guatemala**: 1 ♀, Alta Vera Paz, Sinanja, x.1879 (*Champion*) (genitalia slide no. 13128; BMNH) (paralectotype of *luctuosa*).

Remarks. Externally very similar to *bimendella*, *beckeri* and *luctuosa*, *mackiei* has shorter antennal cilia in the male than *bimendella* or *beckeri* although it has a large basicostal spot on the forewing similar to that in *bimendella*. This spot is, however, suffused with brown whereas it is pure white in *bimendella*. The male genitalia are distinctive in having a pointed saccus, stout valvae with pyramidal apical processes, and the tegumen with triangular laterocaudal processes with rounded apices. The female, provisionally placed here, is distinguished by the elegant arrangement of spicular signa in a pair of opposed T-shaped clusters at the mid-length of the corpus bursae.

Meyrick originally identified the paratype of this species in his collection as 'Cranaodes bimendella Z.'.

***Daviscardia bicolorella* sp. n.**

(Figs 30, 94)

ADULT (Fig. 30). ♂, 17, 18 mm. Coloration and external structure similar to *bimendella* but frons whitish with a few brown lateral scales; entire inner surface of labial palpus whitish; antennal flagellum pale buff; cilia only 1·0 × flagellar diameter. Forewing purple-brown with very broad posterior and terminal cream fascia, tinged with orange-brown on dorsum and with some scattered brown scales in terminal fascia. Hindwing slightly greyish cream, some darker grey flecks at apex; mid-leg light grey-brown above and on outer surface of tibia, pale at articulations, tibia with oblique pale band on outer surface at one-half; outer mid-tibial spur 0·4 length of inner; outer proximal hind tibial spur 0·6 length of inner spur.

GENITALIA ♂ (Fig. 94). Saccus triangular but rounded apically, with vinculum and tegumen forming a distinctly elongate genital armature; uncus lobes small, widely separated, strongly sclerotized, forming ventrally-directed lobe with strongly setose inner surface. Tegumen extended laterocaudally to form pair of sharp, spine-like processes. Subscaphium present, narrow, only slightly sclerotized. Juxta, if developed, fused with valvae and not recognizable, but possibly forming hemicylindrical process between valvae; transtilla hardly sclerotized but represented by thickened diaphragma forming a rigid cowl-shaped structure dorsal to valvae. Valva simple, apex ridged and sinuate. Aedeagus slender, about 20 × as long as broad at middle, without carinae; vesica with four or five short sagittate cornuti.

GENITALIA ♀. Unknown.

DISTRIBUTION. Bolivia.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 2 ex.

Holotype ♂, **Bolivia**: Cochabamba (Yunga del Espiritu Santo), 1888–9 (*Germain*) (genitalia slide no. 13121; BMNH).

Paratype. 1 ♀, data as holotype (BMNH).

REMARKS. This species, while superficially similar to *bimendella*, *beckeri*, *luctuosa* and *mackiei*, is distinguished by its short antennal cilia, glossy and markedly contrasting forewing fasciae with very little brown speckling in the pale fascia, lack of pale costal spots, and its uniformly pale-coloured frons and vertex. The male genitalia are distinguished by the elongate genital armature, sharp-tipped and horn-like laterocaudal tegumen processes (somewhat similar to those of *beckeri*), and by the hemicylindrical ventral structure (?juxta) between the bases of the valvae. This is the only species of *Daviscardia* that has a long and narrow aedeagus with only a few cornuti. All other species have an aedeagus about 10 times as long as broad and with numerous spicular cornuti. *D. bicolorella* has an aedeagus about 20 times as long as broad with only four or five small cornuti.

***Daviscardia* species A**

(Fig. 95)

ADULT. ♂, 18 mm. Vertex and frons light ochre. Labial palpus dark brown, apex ochreous. Antennal cilia 2·0 × flagellar diameter. Thorax and tegula dark brown anteriorly, whitish posteriorly. Forewing pattern similar to that of *bimendella* but without pale costal spots; distal half and terminal area of continuous pale fascia strongly flecked with purple-brown, strong spot at apex of R_4. Hind wing light grey. Outer mid-tibial spur 0·4 length of inner; outer proximal hind tibial spur 0·75 length of inner spur.

GENITALIA ♂ (Fig. 95). Saccus shallow, rounded; uncus lobes widely separated, but fused basally, each forming shallow caudal and slightly longer ventral setose lobe. Tegumen extended laterocaudally to form two pairs of digitate processes. Subscaphium ribbon-like, ill-defined. Juxta, if developed, fused with valvae and not recognizable; transtilla possibly developed as a broadly triangular region of thickened membrane.

Valva ridged on internal surface, spatulate, with truncated apex. Aedeagus stout, about 10 × as long as broad at middle, with subapical group of numerous spicular carinae; vesica with numerous strong spicular cornuti.

Genitalia ♀. Unknown.

Distribution. Mexico.

Biology. Unknown.

Material examined. 1 ex.
Mexico: 1 ♂, Oaxaca, km 140 on highway 175, 4000′, 22.v.1969 (*Howden*) (UC).

Remarks. This species may be distinguished from all other *Daviscardia* by its having two processes from each corner of the tegumen rather than one. Superficially, it resembles *bimendella* and its allies but, like *bicolorella*, *radulella* and *lupulella* (and, possibly, *hypocritella*), the head vestiture is coloured uniformly. *D. bicolorella* has whitish head vestiture but the present species, *radulella, lupulella* and *hypocritella* have the frons and vertex a light shade of ochre. This species may be separated from *radulella* (the only one of these species of which the male is known) by its longer antennal cilia (twice the flagellar diameter in this species but only as long as the flagellar diameter in *radulella*).

Daviscardia lupulella sp. n.

(Figs 31, 149)

[*Phycis luctuosa* Walsingham, 1914: 358. Partim – 1 ♀ only. Misidentification.]

Adult (Fig. 31). ♀, 23 mm. Vertex and frons light orange-brown (but very worn). Labial palpus brown, paler on inner surface. Maxillary palpus brownish grey, 3-segmented, but longer than in preceding species, almost reaching apex of second segment of labial palpus. Antennal scape, pedicel and flagellum dark brown but scape and distal region of flagellum ochreous above; cilia 0·7 × flagellar diameter. Thorax and tegula dark brown in anterior half, light orange-brown posteriorly. Forewing purple-brown with ill-defined and slightly paler costal spots at one-third and two-thirds; with brownish cream terminal and posterior fascia strongly tinted posteriorly and basally with orange-brown; strong dark spot at apex of R_4; further smaller spots on apices of M_1, M_2 and M_3; pale fascia sparsely flecked with purple-brown scales; posterior margin of purple-brown fascia with shallowly V-shaped medial emargination. Hind wing grey. Foreleg and mid-leg grey-brown, darker above, pale at articulations (hind legs missing); outer mid-tibial spur 0·5 length of inner spur.

Genitalia ♂. Unknown.

Genitalia ♀ (Fig. 149). Eighth tergite longer than eighth sternite, with three or four pairs of strong subapical setae and numerous terminal and subterminal pits; eighth sternite smooth dorsal to ostium, ventral lip of ostium m-shaped, lobes each bearing one pair of large setae and numerous small setae. Antrum with nodular/microtrichiate internal surface, strongly sclerotized but not forming a colliculum anteriorly, terminating well beyond anterior margin of eighth sternite. Inception of ductus seminalis at apex of antrum. Corpus bursae elongately pyriform, posterior region thin-walled, appearing finely reticulate under phase-contrast; strongly wrinkled in a coarse reticular pattern and thick-walled medially; anteriorly very thin-walled; signa absent.

Distribution. Panama.

Biology. Unknown.

Material examined. 1 ex.
Holotype ♀, **Panama**: Volcan de Chiriqui, 2000–3000′, 1881 (*Champion*) (genitalia slide no. 12392; BMNH) (paralectotype of *luctuosa*).

Remarks. This and the following species, *hypocritella*, are distinctive in that they are large and plain-patterned (and probably glossy-looking when fresh). The coloration of the head vestiture is uniform. The maxillary palpus is more elongate in this than in other *Daviscardia* species and the pale forewing fascia is more strongly tinted with orange-brown. The genitalia are distinctive in that there is an elongate, strongly sclerotized antrum and, as in *hypocritella*, no sclerotization of the ductus bursae. The m-shaped ventral lip of the ostium is similar to that seen in *luctuosa* and *mackie*; but quite unlike that of *hypocritella* which is almost transverse and with a deep and narrow medial emargination.

Daviscardia hypocritella **sp. n.**

(Figs 32, 151)

ADULT (Fig. 32). ♀, 24 mm. Coloration and external structure similar to preceding species, but coloration of head, thorax and legs uncertain, owing to covering of fungal hyphae. Forewing with whitish fascia paler; distal margin of purple-brown fascia slightly concave, turned at right-angles close to tornus, posterior margin only slightly concave medially, otherwise nearly straight; posterior fascia only slightly tinted with orange-brown on dorsum; pale fascia sparsely flecked with purple-brown scales; purple-brown spot at apex of R_4 only.

GENITALIA ♂. Unknown.

GENITALIA ♀ (Fig. 151). Eighth tergite longer than eighth sternite, with four pairs of strong subapical setae, a few terminal pits and a pair of small setae; eighth sternite with terminal ostium, almost square-ended, ventral lip of ostium with deep and narrow medial emargination; posterior margin with two pairs of elongate strong setae and numerous smaller setae. Antrum short, hardly sclerotized, internal surface nodular/microtrichiate, apex forming a strongly sclerotized colliculum, its apex level with anterior margin of eighth sternite. Ductus bursae elongate, lined with sparse microtrichia, finely reticulate close to corpus bursae if observed under phase-contrast (×250); inception of ductus seminalis at one-fifth posteriorly. Corpus bursae spherical, posterior half thick-walled with strong transverse wrinkles; signa absent.

DISTRIBUTION. Panama.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.
Holotype ♀, **Panama**: Chiriqui, 1899 (*R.*) (genitalia slide no. 13125; BMNH).

REMARKS. The pale forewing fascia of this species is not as strongly spotted with dark brown nor as strongly suffused posteriorly with orange-brown as in *lupulella*. The genitalia are distinctive and markedly different from those of the four other species of *Daviscardia* of which the female is known. The elongate ductus bursae and spherical corpus bursae are peculiar to *hypocritella*, and it is the only *Daviscardia* species in which the ventral lip of the ostium is not even approximately m-shaped.

The holotype of this species was originally identified by Meyrick in his collection as 'Cranaodes bimendella Z.' along with the present paratype of *mackiei*.

SCARDIA Treitschke

Scardia Treitschke, 1830: 291. Type-species: *Phycis boleti* Fabricius, 1798: 463, by subsequent designation by Busck, 1914: 65.
Agarica Sodoffsky, 1837(6): 20 (93). Type-species: *Phycis boleti* Fabricius, 1798: 463. [Unnecessary objective replacement name for *Scardia* Treitschke.]
Fernaldia Grote, 1881: 274. Type-species: *Fernaldia anatomella* Grote, 1881: 274, by monotypy. **Syn. n.**
Duomitella Koshantschikov, 1923: 22. Type-species: *Duomitella relicta* Koshantschikov, 1923: 23, by monotypy. [Synonymized by Zagulajev, 1973: 83.]

DIAGNOSIS. Antenna (male) lacking dorsal cilia, ventral surface without scales; cilia shorter than 1·5 × flagellar diameter. Scape with more than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; pattern consisting of pale termen and dorsum on darker ground-colour. Male with coremata in eighth abdominal segment; coremata not associated with apodemes. Male genitalia with complex uncus fused with tegumen; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva forming ventral hook or hooks, or with spines; valvae + juxta fused ventrally into a single movable complex, valvae without longitudinal cleft; saccus wider than long; juxta complex, conspicuous, entire, not divided medially; vesica with spicular cornuti; aedeagus smooth-surfaced, without spicular carinae.

CONSPICUOUS AUTAPOMORPHIES. Uncus fused with bases of valvae, with pair of elongate horn-like internal processes; female with frenulum of about 15 strong bristles.

DISTRIBUTION. Western and eastern Palaearctic region; Oriental region – NE. India, Borneo; Nearctic region; Neotropical region – Venezuela.

Biology. See under entries for individual species.

Key to species of *Scardia*

Males (males of *alleni* are unknown)

1	Uncus lobes elongate, tapered, conspicuous	2
–	Uncus lobes very short, inconspicuous	4
2	Tegumen extended caudally, dorsal to uncus lobes, forming a cowl-shaped process (Fig. 98). (eastern Palaearctic region)	***amurensis*** (p. 89)
–	Tegumen with U-shaped medial emargination, membrane within emargination bearing strong setae. (western Palaearctic region)	3
3	Costa of valva with shallow flap at three-quarters; apex of valva with U-shaped emargination (Figs 99, 100). (Europe east to Siberia, south to Yugoslavia)	***boletella*** (p. 90)
–	Costa of valva lacking shallow flap; apex of valva only slightly concave. (Caucasus)	***caucasica*** (p. 92)
4	Uncus lobes each with pair of thorn-like processes; two groups of strong dorsal setae associated with uncus lobes – setae elongate, extending well beyond processes of uncus lobes (Fig. 96). (Nearctic and (?)Neotropical regions)	***anatomella*** (p. 87)
–	Uncus lobes reduced to a pair of small pads, lacking processes; single medial group of setae associated with uncus lobes – setae short, not extending beyond finger-like lateral projections of tegumen (Fig. 97). (NE. India)	***assamensis*** (p. 88)

Females (females of *assamensis* are unknown)

1	Ventral lip of ostium with deep medial emargination at least as deep as wide	2
–	Ventral lip of ostium hardly or only shallowly emarginate medially, emargination wider than deep	4
2	Ventral lip of ostium with deep, narrow medial emargination many times deeper than wide (Fig. 154). (eastern Palaearctic region)	***amurensis*** (p. 89)
–	Ventral lip of ostium with V-shaped emargination no more than twice as deep as wide	3
3	Ventral lip of ostium with emargination as deep as wide (Fig. 155). (Europe east to Siberia, south to Yugoslavia)	***boletella*** (p. 90)
–	Ventral lip of ostium with emargination deeper than wide (Fig. 156). (Caucasus)	***caucasica*** (p. 92)
4	Ventral lip of ostium shallowly concave; pair of shallow, lateral, keel-like processes on eighth sternite bearing elongate, apical setae (Fig. 153). (Nearctic and (?)Neotropical regions)	***anatomella*** (p. 87)
–	Ventral lip of ostium with broad, U-shaped emargination; eighth sternite without keel-like processes, elongate setae scattered near ventral margin of ostium (Fig. 152). (Borneo)	***alleni*** (p. 90)

Scardia anatomella (Grote) **comb. rev.**

(Figs 33, 34, 96, 153)

Fernaldia anatomella Grote, 1881: 274; Davis, 1983: 5. LECTOTYPE ♀, U.S.A. (BMNH), here designated [examined].

Scardia fiskeella Busck, 1908: 93. Holotype ♀, U.S.A. (NMNH) [examined]. [Synonymized by Davis, 1983: 5.]

Scardia anatomella (Grote) Walsingham, 1882: 171; Dyar, [1903]: 568; Dietz, 1905: 24; McDunnough, 1939: 104.

Adult (Figs 33, 34). ♂♀, 20–34 mm. Coloration and external structure similar to *boletella* but antennal cilia only 0·4 × (♀) flagellar diameter and distal segments of antenna light brown. Forewing with little or no orange-brown scaling on veins; in specimen from Venezuela (Fig. 34) cream markings not as strongly speckled with brown as in *boletella*; cream markings at posterior margin reduced in several examples.

Genitalia ♂ (Fig. 96). Saccus broad, shallow; uncus lobes very short and reduced, highly modified, with elongate and spine-like dorsal processes and shallow, dentate dorsal ridge, setae few, restricted to mediodorsal region. Caudal margin of juxta-tegumen complex strongly emarginate, with four pairs of strong spines arising from fused base at dorsocaudal margin of each uncus lobe. Subscaphium not developed. Juxta U-shaped, with further inverted U-shaped sclerotization within the 'U', fused laterally with valvae, extended distally into pair of claw-shaped processes; transtilla not developed. Valva with ventral margin strongly angled outward, apical margin strongly emarginate and with shallow subapical flap running obliquely across ventrocaudal region, with weak medial longitudinal ridge and with shallow triangular process close to costa at one-half. Aedeagus tapered, simple, 4 × as long as broad at base, apex obliquely truncated; vesica with a few scattered minute spicular cornuti (microtrichia) close to inception of ductus ejaculatorius (i.e., at apex of vesica when everted).

GENITALIA ♀ (Fig. 153). Eighth tergite slightly longer than eighth sternite, inverted shield-shaped anterior region strongly sclerotized, posterior quarter almost membranous but with five pairs of strong submarginal setae and numerous smaller setae, these scattered almost to mid-length of tergite; eighth sternite folded to form strongly sclerotized posterior lobe overlying deep pocket (a 'false antrum'), then folded again ventrally and slightly anteriorly to form pair of shallowly triangular lobes only slightly sclerotized mesally and forming lateral margins of ostium; lobes each with three strong setae and four or five smaller setae. Anterior margin of ostium membranous and ill-defined; sternite deepened dorso-ventrally at anterior end to accommodate antrum. Antrum ill-defined, slightly tapered anteriorly, extending slightly beyond anterior margin of eighth sternite; inception of ductus seminalis close to anterior end of antrum. Ductus bursae slightly less than one-half length of apophyses anteriores, thin-walled. Corpus bursae elongately ovoid, thin-walled except for posterior third which is apparently thicker and more heavily-staining, reaching 1·3 length of apophyses anteriores; signa absent.

DISTRIBUTION. U.S.A. (New York – Grote, 1881; North Carolina – Busck, 1908; Louisiana; Arkansas; Oregon – Walsingham, 1882; California – Powell, [1968]; Florida – Kimball, 1965; Pennsylvania – Forbes, 1923; Illinois, Texas, Utah – Dietz, 1905); Canada (Ontario – Forbes, 1923); Venezuela.

BIOLOGY. Described by Walsingham (1882) who bred several specimens from larvae collected in Oregon in March. The larvae were boring round holes in a fallen dead pine tree.

MATERIAL EXAMINED. 14 ex., 5 pupae.

Lectotype ♀ (of *anatomella*) (abdomen missing), **U.S.A.**: New York (*Grote*) (BMNH). Holotype ♀ (of *fiskeella*), **U.S.A.**: North Carolina, Tryon, 8.vii.1904 (*Fiske*) (genitalia slide no. 18664; NMNH).

U.S.A.: 9 ex., Oregon, Grant Co., Camp Watson, in dead wood (pine), coll. iii, em. vi.1872 (*Walsingham*) (genitalia slide nos. 19195, 12389, 12390; BMNH); 1 ♂, Louisiana, 1884 (*Morrison*) (BMNH); 1 ♀, Arkansas, Hope, vi.1926 (BMNH). **Venezuela**: 1 ♂ (ex Felder coll.) (BMNH).

REMARKS. The only New World species of *Scardia, anatomella* is characterized by the genitalia of both sexes: in the male the uncus lobes are short and modified into spine-like processes; the female genitalia differ from other *Scardia* in that the triangular membranous lobe dorsal to the ostium is lacking, as in *amurensis*, and the eighth sternite has a conspicuous and strongly sclerotized posterior margin that is dorsal to the ostium. This strongly developed posterior region also occurs in *amurensis* but in that species it is deeply cleft and overlaid (in ventral view) by a pair of lateral processes directed caudally and extending beyond this posterior and dorsal region of the sternite.

The specimen from Venezuela is from the Felder collection. It may be labelled incorrectly. It is lighter and with a more strongly marbled appearance to the forewings than specimens from the U.S.A.: this is due to the lack of brown speckling within the cream forewing markings, and the comparatively larger pale costal spots.

I am unable to resolve convincingly the phylogeny of the six *Scardia* species. *S. boletella* and *caucasica* are clearly sister-species, their sister-group being *alleni* (synapomorphy: membranous triangular lobe overlying ostium dorsally). The sister-group of *boletella* + *caucasica* + *alleni* is probably *amurensis* (synapomorphy: elongate and tapered uncus lobes). The precise relationship of this grouping to *anatomella* and *assamensis*, which retain the short, squat uncus complex also observed in *Daviscardia*, the probable sister-group of *Scardia*, is uncertain. However, the uncus lobes in *anatomella* are almost completely separated from the tegumen by membrane whereas in all other *Scardia* species they are almost completely fused; the degree of separation observed in *anatomella* is similar to that observed in *Daviscardia* and is considered to be the ground-plan state of the character. On the basis of this decidedly weak feature, *anatomella* is the sister-group of all other *Scardia*.

***Scardia assamensis* sp. n.**

(Figs 35, 97, 101)

ADULT (Fig. 35). ♂, 24 mm. Coloration and external structure similar to *boletella* but frons and vertex dark reddish brown, thorax and tegula deep purple-brown. Forewing (worn) lacking extensive pale posterior fascia, with only scattered whitish scales close to posterior margin; pale markings of terminal fascia silver-grey, not as extensive as in *boletella*. Hindwing fringe not chequered.

GENITALIA ♂ (Figs 97, 101). Saccus broad, shallow; uncus lobes short, apices short and digitate and widely separated, strongly sclerotized and with setae restricted to laterodorsal region. Fused uncus-tegumen complex strongly emarginate medially, membrane of emargination bearing conspicuous group of about 40 strong spines. Subscaphium not developed. Juxta trapezoidal, fused laterally with valvae, extended distally to form pair of hand-shaped processes; transtilla not developed. Valva simple, with small shallow hook-like process at apex. Aedeagus stout, about 5 × as long as broad at base, strongly sclerotized, apex laterally emarginate; vesica with scattered minute spicular cornuti (microtrichia) for half its length closest to inception of ductus ejaculatorius (i.e., in apical half of vesica if it were everted).

GENITALIA ♀. Unknown.

DISTRIBUTION. India – Assam.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.
Holotype ♂, **India**: Assam, Khasi Hills, Cherrapunji, v.1895 (*native collector*) (genitalia slide no. 1514; BMNH).

REMARKS. This is the only Old World *Scardia* species in which the lobes of the uncus are short. *S. assamensis* is small; it lacks the extensive pale fascia at the posterior margin of the forewing that characterizes other *Scardia* with the exception of *alleni*. It is the only species in which the head, thorax and tegulae are entirely dark brown and the only one in which the horn-like lateral processes from the juxta are modified and hand-shaped, bearing small digitate subterminal processes.

Scardia amurensis Zagulajev

(Figs 36, 98, 154)

Scardia amurensis Zagulajev, 1965: 411; 1973: 96; Moriuti, 1982: 163. Holotype ♂, U.S.S.R. (ZI) [examined]
[(?) *Scardia boletella* (F.); Caradja, 1939: 111. Misidentification.]
[*Scardia boletella* (F.); Issiki, 1957: 16. Misidentification.]

ADULT (Issiki, 1957: pl. 2, fig. 46 (colour); Moriuti, 1982: pl. 2, fig. 12 (♀), pl. 227, fig. 1 (♂) (colour); Fig. 36). ♂♀, 39–42 mm. Coloration and external structure similar to *boletella*.

GENITALIA ♂ (Zagulajev, 1965: fig. 1; Zagulajev, 1973: figs 15B, 16b, 75; Moriuti, 1982: pl. 248, figs 10, 10a; Fig. 98). Saccus broad, shallow; uncus lobes flattened laterally, strongly sclerotized, setose, tapered to a point; tegumen extended dorsocaudally to form overlying triangular process, spined membranous dorsal recess thus absent. Subscaphium not developed but membrane of diaphragma in this region forming shallow lateral pockets with transverse wrinkling. Juxta quadrate, fused laterally with valvae, extended distally into pair of claw-like processes, with doubly bulbed shallow ventral process; transtilla not developed. Valva almost square, simple, costa extended caudally in a simple, rounded extension that is bulbous subapically; slight basal ridge on internal surface of valva close to patch of about 10 short, strong setae. Aedeagus 5 × as long as broad at base, explanate apically, planarian-shaped; vesica with minute spicular cornuti (microtrichia) close to inception of ductus ejaculatorius (i.e., at apex if vesica were everted).

GENITALIA ♀ (Zagulajev, 1973: figs 76, 77; Fig. 154). Eighth tergite slightly longer than eighth sternite, inverted shield-shaped anterior region strongly sclerotized, posterior quarter almost membranous but with five pairs of strong submarginal setae and numerous smaller setae; eighth sternite strongly folded to form pair of lateral setose digitate processes, each overlying a cushion-shaped lobe; ostium a deep fold behind these cushion-like lobes, ventral margin a narrow bridge between them. Course of antrum complex, oriented dorso-ventrally through base of cushion-like lobes then turned anteriorly and forming a colliculum-like apex just anterior to margin of eighth sternite; inception of ductus seminalis apparently close to inner bases of cushion-like lobes (i.e., remarkably posterior). Ductus bursae very thin-walled, one-half length of apophyses anteriores, with fine and numerous irregular transverse constrictions. Corpus bursae ovoid, very thin-walled, reaching 1·3 length of apophyses anteriores; signa absent.

DISTRIBUTION. U.S.S.R. – Amur and Primorsk regions; (?) China (Caradja, 1939); Japan.

BIOLOGY. Specimens have been collected on the trunk of a rotting tree and bred from larvae living in fungus (Zagulajev, 1973); the Japanese specimen examined (see below) was bred from *Fomes fomentarius*.

MATERIAL EXAMINED. 10 ex.

Holotype ♂, **U.S.S.R.**: Primorsk Terr., Spassk-Dalniy, at light, 5.viii.1950 (*Zagulajev*) (ZI).

U.S.S.R.: 1 ♂ (paratype), Amur Prov., Svobodnyi Dist., Simonovo vill., at light, 1.viii.1959 (*Falkovitsh*) (ZI); 1 ♂ (paratype), Primorsk Terr., Suchan, on trunk of rotting tree, 16.viii.1950 (*Zagulajev*) (ZI); 1 ♀, Ussuri, Kaimanovka vill., 28–31.vii.1964 (*Tsvetayev*) (ZI); 1 ♂, 1 ♀, Suputinskiy Reserve, bred from larva in fungus, 14.v.1967 (*Mamaev*) (BMNH; ZI); 2 ♀, Ussuri Railway, Chabarovsk, 14.vii.1910 & 23.vii.1911 (*Borsow*) (BMNH); 1 ex., data not recorded (ZI). **Japan**: 1 ♂, Ehime Pref., Mt Sara, bred from *Fomes fomentarius*, em. 8.v.1954 (*Hisamatsu*) (genitalia slide; coll. S. Moriuti, Osaka).

REMARKS. The wing-pattern of this species and the morphology of the male genitalia are very similar to those of *boletella* (see 'Remarks' for that species) and *caucasica*. The female genitalia, however, are markedly different, lacking the triangular membranous lobe dorsal to the ostium and having the eighth sternite conspicuously modified as described above.

Caradja's record of 'boletella' from China, probably referable to this species, has not been confirmed by examination of the original specimen.

Scardia alleni sp. n.

(Figs 37, 152)

ADULT (Fig. 37). ♀, 31 mm. Coloration and external structure similar to *boletella* but frons and vertex brownish yellow, maxillary palpus dark purple-brown, thorax cream, tegula dark purple-brown. Forewing with pale markings almost obliterated by dark purple-brown, a few silvery white scales close to posterior margin at one-half; terminal fascia composed of discrete silvery white spots not speckled with brown as in *boletella*. Hindwing charcoal grey, a few slightly paler flecks towards apex, fringe not chequered.

GENITALIA ♂. Unknown.

GENITALIA ♀ (Fig. 152). Eighth tergite slightly longer than eighth sternite, with four pairs of elongate, strong setae close to posterior margin, and with a few scattered minute thorn-like setae; eighth sternite separated by membranous sutures into roughly triangular mediocaudal and lateral sclerites; mediocaudal region rugose, posterior margin strongly concave, with five pairs of strong setae and numerous smaller setae; ostium overlain dorsally by triangular membranous lobe, wall of ovipositor dorsal and slightly posterior to apex of lobe ballooned ventrad to form pair of shallow lobes. Antrum very short, conical, sclerotized strongly at anterior end and forming a colliculum-like constriction. Ductus bursae thick-walled, with strong and regular transverse constrictions on inner surface (this apparent restriction to the inner surface may be an artefact caused by separation of the outer layer of the membrane of the ductus). Corpus bursae contiguous with ductus, elongately ovoid, reaching 1·5 length of apophyses anteriores; signa absent.

DISTRIBUTION. Borneo – Brunei.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

Holotype ♀, **Brunei**: Labi, lowland forest, 60 m, 12.i.1980 (*Allen*) (genitalia slide no. 1517; BMNH).

REMARKS. Of the six *Scardia* species, *alleni* is the darkest, the pale terminal and posterior fasciae of the forewing being markedly reduced in comparison with the other species. The hindwing is distinctively darker than in the other species. The genitalia resemble those of *boletella* and *caucasica* in that there is a triangular membranous lobe dorsal to the ostium, but the ventral margin of the ostium lacks the deep U- or V-shaped invagination of these species and the membranous lobe lacks a terminal sclerite.

The locality in which the holotype was collected is on the Rampayoh River in an area of low hills forested with typical lowland dipterocarp forest (Allen, pers. comm.).

Scardia boletella (Fabricius) **nom. rev.**

(Figs 38, 99, 155)

[*Phalaena (Tinea) gigantella* [Denis & Schiffermüller]; Hübner, 1790: 38, pl. 2(2), fig. F. Misidentification.]

Tinea boletella Fabricius, 1794: 287. LECTOTYPE (?) ♀, [AUSTRIA or SWEDEN], (ZM), here designated [examined].

Phycis ‡*boleti* Fabricius, 1798: 463. Unjustified emendation of *boletella*.

Noctua polypori Esper, [1804]: pl. 196, fig. 1; [1805]: 64. Unnecessary objective replacement name for *Phycis boleti* F., 1798 (cited as 'Tinea Boleti') which is an unjustified emendation of *Tinea boletella* F., 1794.

Duomitella relicta Koshantschikov, 1923: 23. Syntypes, 1 ♂, 1 ♀, U.S.S.R. (ZI) [examined]. [Synonymized by Zagulajev, 1973: 89.]

ADULT (Hübner, 1796: pl. 3, fig. 18; Esper, [1804]: pl. 196, fig. 1; Zagulajev, 1973: figs 31, 32, 66, pl. 2, fig. 1; Fig. 38). ♂♀, 37–60 mm. Vertex and frons brownish cream, brown close to eyes. Labial palpus cream, brown on outer surface of first and second segment and in middle of third segment. Maxillary palpus cream flecked with brown. Antennal scape, pedicel and flagellum dark brown; cilia 1·2 × (♂) or 0·7 × (♀) flagellar diameter. Thorax cream flecked with brown; tegula brown, cream posteriorly. Forewing cream, strongly patterned with dark purple-brown, with orange-brown on veins; cream coloration almost obliterated by brown and restricted to termen and posterior margin, with a few pale flecks towards costa; fringe conspicuously chequered. Hind wing light grey-brown, pale flecks towards apex; fringe chequered. Legs cream, strongly flecked with brown but pale at articulations; outer mid-tibial spur 0·6 length of inner; outer proximal hind tibial spur 0·7 length of inner spur.

GENITALIA ♂ (Petersen, 1957: fig. 238; Zagulajev, 1973: figs 14B, 67; Fig. 99). Saccus broad, shallow; uncus lobes flattened laterally, strongly sclerotized, setose and tapered to a point; tegumen with dorsal emargination bearing five or six pairs of strong spines; dorsal region of fusion of uncus lobes and tegumen broad, with shallow lateral invaginations. Subscaphium not developed, but membrane in this region with lateral patches of lamellate microtrichia. Juxta broadly V-shaped, fused laterally with valvae, extended distally into pair of horn-shaped processes; transtilla not developed. Valva simple but with shallow and rugose costal flap and with mediobasal fold; apical margin with broadly U-shaped emargination. Aedeagus 10 × as long as broad, strongly sclerotized but simple; vesica with minute spicular cornuti (microtrichia) close to inception of ductus ejaculatorius (i.e. at apex if vesica were everted).

GENITALIA ♀ (Petersen, 1957: fig. 239; Zagulajev, 1973: figs 68, 69; Fig. 155). Eighth tergite slightly longer than eighth sternite, with slightly concave caudal margin, with four pairs of strong marginal setae at posterior corners and seven or eight pairs of smaller submarginal setae; eighth sternite oval, strongly keeled, ventral margin of ostium V-shaped, with small medial emargination; lobes either side of ostium each bearing six stout setae and a few smaller setae; ostium surmounted by membranous posteriorly-extended lobe bearing elongate heart-shaped sclerite with shallow lateral invaginations; posterior to lobe and sclerite a deep anteriorly-directed pocket forming a 'false antrum'. Antrum hardly sclerotized, tapered anteriorly, reaching anterior margin of eighth sternite; inception of ductus seminalis just anterior to colliculum-like apex of antrum. Ductus bursae one-half length of apophyses anteriores, with irregular transverse constrictions, very thin-walled. Corpus bursae ovoid, very thin-walled, reaching 1·3 length of apophyses anteriores.

DISTRIBUTION. Norway (Aarvik & Midtgaard, 1982); Sweden (Petersen, 1957); Finland (Jalava, 1977); U.S.S.R. – Baltic and European regions, Crimea, Siberia (Zagulajev, 1973); West Germany (Petersen, 1968); Czechoslovakia (Petersen, 1965); Hungary (Petersen, 1957); Rumania; Austria (Petersen, 1957); Switzerland (Rebel, 1901); Italy (Petersen & Gaedike, 1979); Yugoslavia.

BIOLOGY. See Zagulajev (1973: 93) – bred from *Fomes*, *Ganoderma* and *Polyporus*. Zagulajev (1973: figs 20, 22, 26, 27) illustrates the larva. The biology is also described briefly by Mitterberger (1910: 171) and Koshantschikov (1923). The latter author found three live pupae enclosed in webbed frass on fungi on a dead birch, and he also found three large larvae (which he preserved) in the fungus.

MATERIAL EXAMINED. 54 ex., 4 pupae.

Lectotype (?)♀ (of *boletella*) (abdomen missing), [**Austria** or **Sweden**]: labelled 'boleti' in Fabricius' hand (Sehested & Tonder Lund collection, ZM).

Syntypes (of *relicta*), **U.S.S.R.**: Siberia, Irkutsk, Minussinsk dist., Sajan Mts, Tiberkul Lake: 1 ♂, 21.vii., 1 ♀, 17.vii.1920 (*Koshantšchikov*) (ZI).

37 ex., 4 pupae (ZI) and 15 ex. (BMNH), various localities (see 'Distribution' and Zagulajev (1973)).

REMARKS. Esper expressly proposed the name *polypori* as a replacement name for 'Tinea Boleti' which he considered preoccupied by *Noctua boleti* F., 1777.

This species is one of the largest Tineidae and has a wide but sporadic boreo-alpine/cold temperate distribution in the western Palaearctic region, occurring in montane localities as far south as Italy and Yugoslavia. It may be separated from all other *Scardia* by the genitalia, characteristic in both sexes but very similar indeed to those of *caucasica*; the latter species represents an isolated geographical race of *boletella* only arguably deserving of specific status. With *caucasica, boletella* may be separated from all other *Scardia* by the elongate and pointed lobes of the uncus in the male and by the triangular membranous lobe that overlies the ostium of the female and terminates in a laterally invaginated sclerite. The only other *Scardia* with pointed uncus lobes is *amurensis* (although they may also occur in *alleni* when the male of that species is discovered) in which the tegumen forms a shallow triangular hood above the uncus lobes (the tegumen is emarginate in *boletella* and *caucasica*) and in which the apex of the aedeagus is conspicuously explanate. *S. alleni* has a similar membranous lobe overyling the ostium in the female but the lobe is not sclerotized at its apex. The pronounced allopatry of the *Scardia* species is helpful in identification although further collecting may show the presently disjunct distributions to be artefactual.

Scardia caucasica Zagulajev

(Figs 39, 100, 156)

Scardia caucasica Zagulajev, 1965: 412, figs 2, 3. Holotype ♂, U.S.S.R. (ZI) [examined].

ADULT (Zagulajev, 1973: fig. 70; Fig. 39). ♀, 44 mm. Coloration and external structure similar to *boletella*.

GENITALIA ♂ (Zagulajev, 1965: figs 3, 19; 1968: fig. 16; 1973: fig. 72; Fig. 100). Similar to *boletella* but dorsal margins of uncus lobes not extended as far caudally (in lateral view); dorsal region of tegumen narrow, with deep lateral indentations; valva with costal flap hardly developed, apical margin only shallowly concave.

GENITALIA ♀ (Zagulajev, 1965: fig. 2; 1968: fig. 17; 1973: fig. 73; Fig. 156). Similar to *boletella* but eighth tergite with only three pairs of large setae and two or three pairs of small setae; ventral margin of ostium deeper, V-shaped; lobes either side of ostium more elongate, each with four strong setae arranged in a diagonal line at one-half, smaller setae concentrated at apex. Lobe dorsal to ostium broader and shorter, with dome-shaped terminal sclerite with small, deep lateral invaginations.

DISTRIBUTION. U.S.S.R. – Caucasus.

BIOLOGY. Zagulajev (1973) collected a male of this species on a fungus-infested ash trunk.

MATERIAL EXAMINED. 10 ex., 4 pupae.

Holotype ♂, **U.S.S.R.**: Caucasus, Georgia, Lagodekhi, 8.viii.1961 (*Zagulajev*) (ZI).

U.S.S.R.: Caucasus: 1 ♂, Tbilisi dist., Manglis, 13.ix.1882 (*Christoph*) (ZI); 1 ♀, 4.viii.1891 (*Hedemann*) (ZI); 1 ♀, Lagodekhi, 1888 (*Mlokosevitch*) (ZI); 2 ♂, 3 ♀, Lagodekhi, wet forest in lower zone of reserve, 27–30.vii and 8.viii.1961 (*Zagulajev*) (ZI; 1 ♀ in BMNH) (all paratypes); 1 ♂, Armenia, Idzfrevanskiy dist., 30 km from Sevkar, Kerants Monastery, on fungus-infested ash trunk at dusk, 31.vii.1960 (*Zagulajev*) (ZI).

REMARKS. For differentiation of this species from *boletella*, see above; see also 'Remarks' for *boletella*.

PERILICMETIS Meyrick

Perilicmetis Meyrick, 1932*b*: 323. Type-species: *Perilicmetis diplaca* Meyrick, 1932*b*: 324, by monotypy.

DIAGNOSIS. Antenna (male) lacking dorsal cilia, ventral surface scaled; cilia shorter than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) greater than 1·0. Maxillary palpus with fewer than 5 segments; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_3 and CuA_1 stalked or very closely approximated at base; light grey speckled with dark brown, with broad, dark brown, oblique subterminal fascia. Male with coremata in eighth abdominal segment; coremata without associated apodemes. Male genitalia with complex uncus fused with tegumen; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta simple, entire, not divided medially; vesica lacking spicular cornuti; aedeagus with spicular or spinose carinae.

CONSPICUOUS AUTAPOMORPHIES. Forewing with oblique dark brown subterminal fascia constricted in middle to form a pair of large, narrowly connected spots; remainder of forewing light grey, finely speckled with dark brown.

Distribution. Neotropical region – Brazil.

Biology. Unknown.

Perilicmetis diplaca Meyrick

(Figs 40, 102, 180)

Perilicmetis diplaca Meyrick, 1932*b*: 324. LECTOTYPE ♂, Brazil (NM), here designated [examined].

Adult (Figs 40, 180). ♂, 17–22 mm. Vertex and frons chocolate brown. Labial palpus chocolate brown, outer surface of third segment darker. Maxillary palpus buff, dark brown above, 4-segmented, short, reaching only basal one-sixth of second segment of labial palpus. Antennal scape buff, large dark brown spot above; pedicel dark brown; flagellum pale buff; cilia 0·8 × flagellar diameter. Thorax and tegula greyish white flecked with dark brown anteriorly. Forewing greyish white, strongly flecked with dark brown; conspicuous oblique subterminal fascia formed from pair of large dark brown spots. Hindwing very pale greyish brown, whitish towards base. Legs pale buff; foreleg and mid-leg strongly marked with dark brown above and on sides but pale at articulations; hind tarsus banded with brown; outer mid-tibial spur 0·45 length of inner; outer proximal hind tibial spur 0·5 length of inner spur.

Genitalia ♂ (Fig. 102). Saccus triangular; uncus lobes separated, strongly fused with tegumen, tapered and divergent apically, well-sclerotized, setose. Subscaphium not developed. Juxta represented by only slight ventral thickening of anellus; transtilla not developed. Valva elongate, broad, simple, apex forming slight dorsal hook. Aedeagus 8 × as long as broad, somewhat flattened dorsoventrally, with dense spinose carinae on ventral surface; vesica without cornuti.

Genitalia ♀. Unknown.

Distribution. Brazil.

Biology. Unknown.

Material examined. 7 ex.

Lectotype ♂, **Brazil:** Santa Catharina, Neu Bremen, 23.ii.1931 (*Hoffmann*) (NM).

Brazil: 2 ♂, (paralectotypes) Santa Catharina, Jaragua, 24.viii.1929, 16.ix.1930 (*Hoffmann*) (BMNH; NM); 1 ♂, São Paulo (*Jones*) (BMNH); 1 ♂, Parana, Castro, x.1895 (*Jones*) (BMNH); 1 ♂, Santa Catharina, Neu Bremen, 2.ix.1936 (*Hoffmann*) (genitalia slide no. 6966; BMNH); 1 ♂, Santa Catharina, 18.iii.1936 (*Hoffmann*) (BMNH).

Remarks. The external appearance of this species is very distinctive, the wing-pattern being unlike that of any other tineid known to me. Although the specimens examined are old and probably faded, the forewing ground-colour is distinctly greyish. The only other scardiines that could be thought of as greyish are the *Amorophaga* species. The genitalia of *Perilicmetis* resemble superficially those of *Amorophaga* but the valva is much more simple and the tegumen is complete dorsally.

MOSCARDIA **gen. n.**

Type-species: *Myrmecozela renitens* Meyrick, 1922*b*: 591.

Diagnosis. Antenna (male) lacking dorsal cilia, ventral surface scaled; cilia shorter than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) greater than 1·0. Maxillary palpus 5-segmented in *renitens* but probably with fewer (four or three) segments in *varna*; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; pattern consisting of pale termen and dorsum on darker ground-colour. Male with coremata in eighth abdominal segment; coremata associated with short, lobe-like apodemes at anterior corners of eighth sternite. Male genitalia with complex uncus fused with tegumen; tegumen unbroken, completely sclerotized dorsally (but broken dorsally by a membranous suture line in *renitens*); valva lacking basal setose lobe on inner surface; apex of valva forming ventral hook or hooks, or with spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta simple, entire, not divided medially; vesica lacking spicular cornuti; aedeagus with spicular or spinose carinae.

Conspicuous autapomorphies. None; however, males of *Moscardia* species may be recognized externally by their brown forewing with pale apex and dorsum and completely scaled antenna with short cilia;

exclusive microscopic characters are the short apodemes of the eighth sternite in combination with minute microtrichia on the second sternite.

Distribution. Neotropical region – Brazil, Bolivia.

Biology. Unknown.

Key to species of *Moscardia* (only males are known)

1 Tegumen broken by dorsal line of membrane, without processes; uncus lobes strongly sclerotized and with serrate subapical ridge .... ***renitens*** (p. 94)

– Tegumen complete dorsally, strongly sclerotized, with pair of small lanceolate caudal processes; uncus lobes almost membranous, apices rounded (Fig. 104) .... ***varna*** (p. 95)

Moscardia renitens (Meyrick) **comb. n.**

(Fig. 41)

Myrmecozela renitens Meyrick, 1922*b*: 591. Holotype ♂, Brazil (BMNH) [examined].

Adult (Clarke, 1970: pl. 32, fig. 3; Fig. 41). ♂, 22 mm. Vertex and frons pale whitish ochre, frons strongly tinted reddish brown. Labial palpus very dark brown on outer surface but cream at articulation between second and third segments and at tip; inner surface light brown on second segment, cream on third. Maxillary palpus short, not as long as second segment of labial palpus, but probably 5-segmented, dark brown. Antennal scape and pedicel cream, flecked with light brown; flagellum brownish cream, darker brown on basal few segments; cilia 0·8 × (♂) flagellar diameter. Thorax and tegula medium brown, whitish posteriorly. Forewing badly rubbed; traces of pattern present only at margins, brownish cream flecked with light brown, strongly spotted with dark brown at costa and with strong dark brown spot on posterior margin at two-thirds. Hindwing light greyish brown with slight purple iridescence. Legs cream flecked with brown; foreleg and mid-leg strongly marked with dark brown above and on sides but pale at articulations, outer surface of mid-tibia with broad oblique whitish band; outer mid-tibial spur 0·5 length of inner spur [hind legs missing].

Genitalia ♂ (Clarke, 1970: pl. 32, figs. 3a, 3b). Saccus elongate, triangular, almost as long as valva; uncus lobes triangular, strongly sclerotized, fused with tegumen but with incomplete membranous suture forming line of flexion, with serrate subapical ridge. Subscaphium apparently not developed (but preparation poor). Juxta apparently large and shield-shaped (but preparation damaged in this area and difficult to interpret); transtilla apparently not developed. Valva simple, with small setose lobe on costa at three-quarters and with three small peg-like apical processes; membranous subapical suture on outer surface. Aedeagus stout, 5 × as long as broad, asymmetrical, with three strong, subapical horn-shaped carinae directed caudally, and with three similar but smaller anteriorly-directed carinae closer to apex; vesica without cornuti.

Genitalia ♀. Unknown.

Distribution. Brazil.

Biology. Unknown.

Material examined. 1 ex.

Holotype ♂, **Brazil**: Teffe, i.1920 (*Parish*) (genitalia slide no. JFGC 6653; BMNH).

Remarks. The condition of the holotype of this species, and of the slide of its genitalia, is such that description of the forewing pattern and of the juxta/transtilla/subscaphium region is not possible. Despite this, the genitalia are characterized simply by the structure of the uncus lobes and the valva. *M. renitens* differs from *varna* in that the maxillary palpus of the latter, while as long as that of *renitens*, has apparently only three segments. In *varna* the tegumen is strongly sclerotized and unbroken dorsally and the uncus lobes are almost membranous; the tegumen is produced caudally to form a pair of small, rhomboidal processes. In *renitens* the tegumen is broken dorsally by a zone of membrane, the uncus lobes are strongly sclerotized, and there are no processes from the tegumen.

There is no trace of a pattern of pale apex and dorsum on the forewings of the holotype of *renitens*. Although the specimen is very rubbed, I would have expected to find traces of such a pattern, had one been present. It is possible, therefore, that this species and *varna* have quite different forewing patterns.

Moscardia varna sp. n.

(Figs 42, 104)

[*Phycis luctuosa* Walsingham, 1914: 358, partim – 1 ♂ only. Misidentification.]

ADULT (Fig. 42). ♂, 17 mm. Vertex and frons brownish cream. Labial palpus dark brown on outer surface, paler on inner surface and at apex. Maxillary palpus short, not as long as second segment of labial palpus, probably 4- or 3-segmented, dark brown. Antennal scape and pedicel dark brown above; flagellum light grey-brown; cilia 1·0 × (♂) flagellar diameter; (thorax obscured by glue). Tegula medium brown. Forewing deep purple-brown, with continuous golden brown posterior and terminal fascia occupying more than half of total wing area; scales close to junction with deep brown anterior fascia pale gold, increasing the contrast between the two. Hindwing dark grey. Legs greyish-ochreous (worn and damaged).

GENITALIA ♂ (Fig. 104). Saccus elongate, triangular; uncus lobes small, inturned ventrad, almost membranous, setose, surmounted by strongly sclerotized tegumen with pair of small rhomboidal mediocaudal processes. Subscaphium not developed. Juxta represented only by slight thickening of anellus; transtilla not developed. Valva elongate, twice length of saccus, extending well beyond apices of tegumen lobes; simple, with small and shallow triangular lobe bearing 6 small setae at two-thirds of costa; apex of valva rounded, with spinose setae. Aedeagus stout, 6 × as long as broad, with, either side, subapical group of two triangular basally-directed carinae; vesica without cornuti.

GENITALIA ♀. Unknown.

DISTRIBUTION. Bolivia.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

Holotype ♂, **Bolivia**: Yungas de la Paz, 1908 (*Seebold*) (genitalia slide no. 13122; BMNH) (paralectotype of *Phycis luctuosa* Walsingham).

REMARKS. See 'Remarks' for *renitens* for differentiation from that species. The external appearance of *varna*, with strongly developed, continuous and extensive distal and posterior fasciae on the forewing, is characteristic: the posterior pale fascia extends further anteriorly than in any other species dealt with here. The aedeagus is only lightly sclerotized and has suffered slight damage during preparation. The anellus has been torn and has peeled back the wall of the aedeagus from close to the carinae. Interpretation is therefore difficult but there appear to be a pair of elongate, sinuate processes that originally commenced as ridges at the base of the aedeagus and reached the apices of the (backward-directed) carinae. These are now folded backward from close to the base of the aedeagus and lie within a fold of the anellus.

GENTINGIA gen. n.

Type-species: *Gentingia hollowayi* sp. n.

DIAGNOSIS. Antenna (male) lacking dorsal cilia, ventral surface scaled; cilia longer than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) greater than 1·0. Maxillary palpus with fewer than 5 segments; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 stalked or very closely approximated at base; M_2, M_3 and CuA_1 separate; ground-colour very pale bronze, with pattern of small purple-brown marginal spots and larger costal blotch. Male with coremata in eighth abdominal segment; coremata without associated apodemes. Male genitalia with complex uncus fused with tegumen; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae fused ventrally, without longitudinal cleft; saccus longer than wide; juxta, if present, fused with valvae and not recognizable as such; vesica with spicular cornuti; aedeagus with spicular or spinose carinae.

CONSPICUOUS AUTAPOMORPHIES. Male with tegumen produced laterocaudally into pair of hooked processes; female with scobinate signum surrounding inception of ductus bursae in corpus bursae; interior surface of ductus bursae denticulate anteriorly, posteriorly with overlapping scale-like plaques.

DISTRIBUTION. Oriental region – Malay Peninsula, Borneo.

BIOLOGY. Unknown.

Gentingia hollowayi sp. n.

(Figs 43, 103, 157, 184)

ADULT (Figs 43, 184). ♂♀, 16–19 mm. Vertex and frons pale yellow-brown. Labial palpus ochreous, strongly suffused with brown on outer surface but pale at apex and articulations. Maxillary palpus whitish, flecked with dark brown above, short, apparently 3-segmented. Antennal scape and pedicel ochreous, flecked above with dark brown; flagellum light greyish ochreous, with darker scales basidorsally; cilia 1·5 × (♂) or 0·5 × (♀) flagellar diameter. Thorax and tegula cream, strongly flecked anteriorly with dark brown. Forewing pale golden, strongly spotted with dark purple-brown along costa and termen; strong wedge-shaped dark blotch from costa across end of cell to *CuP*; conspicuous (but frequently abraded) dark spot on middle of dorsum. Hindwing off-white. Legs ochreous cream, foreleg and mid-leg dark brown above; outer mid-tibial spur and outer hind proximal tibial spur 0·6 length of inner spurs.

GENITALIA ♂ (Fig. 103). Saccus triangular, strongly tapered anteriorly; uncus lobes short, small, strongly sclerotized, curved ventrad, burin-shaped, setose, entirely fused with tegumen; tegumen with pair of lateral hook-shaped processes. Subscaphium not developed. Juxta, if present, entirely fused with valvae and not recognizable; transtilla not developed. Valvae strongly fused ventrally to form single movable unit; medioventrally with an m-shaped projecting caudal margin, overlying this a medial thimble-shaped process; apices of valvae rounded, dorsal to the medial structures and extending caudally beyond them; inner margins of valvae emarginate at level of m-shaped process; ventral surface of valva smooth, apically and dorsally with numerous setae, dorsal margin (costa) hardly sclerotized but with line of about six strong setae. Aedeagus tapered, 12 × as long as broad in middle, with lateral bands of thorn-like carinae from one-half to apex; vesica with minute blunt lepidote cornuti (?microtrichia).

GENITALIA ♀ (Fig. 157). Eighth tergite considerably longer than eighth sternite, with two subapical pairs of elongate strong setae, three or four pairs of smaller setae at posterior corners, and with scattered pits in caudal half; eighth sternite triangular, deeply pocketed laterally, apex with V-shaped emargination interrupted by keel-like mediocaudal process with bilobed tip, each lobe bearing pair of elongate strong setae and a few small setae. Antrum broad, funnel-shaped posteriorly then tubular and slightly asymmetrical, meeting ductus seminalis at two-thirds anteriorly, reaching 0·75 length of apophyses anteriores, anterior end strongly microtrichiate, microtrichia extending into ductus bursae. Ductus bursae very thick-walled, internal surface strongly lepidote, the scale-like surface projections arranged in a regular transverse pattern giving the appearance of very fine regular constrictions under low-powered magnification; lepidote projections highly developed anteriorly, resembling sharks' teeth, and continuous with denticles of signum. Corpus bursae thin-walled, with U-shaped denticular signum surrounding inception of ductus bursae.

DISTRIBUTION. Malay Peninsula; Borneo (Fig. 200).

BIOLOGY. Unknown.

MATERIAL EXAMINED. 3 ex.

Holotype ♂, **West Malaysia**: W. Pahang, Genting Highlands, *ca* 4400′, 23.xi.1981 (*Tuck*) (genitalia slide no. 9479; BMNH).

Paratypes. **Sarawak**: 1 ♂, Mt Dulit, R. Koyan, 2500′, primary forest, river-bank vegetation, 18.xi.1932 (*Hobby & Moore*) (BMNH); 1 ♀, Gunung Mulu National Park, G. Mulu site 14 – camp 2.5, G.R. 413461, 1000 m, lower montane forest, at m.v. light in canopy or understorey, ii.1978 (*Holloway et al.*) (genitalia slide no. 9482; BMNH).

REMARKS. This taxon is distinctively patterned and structurally atypical. The wing-pattern strongly resembles that of *Semeoloncha* from West Africa and there are genital similarities in the male, notably in the structure of the tegumen and uncus lobes. The valvae of the two genera are very different, however, *Semeoloncha* having a pair of separated soft, lobate, strongly setose valvae with an extraordinary process from the modified apodeme. Both genera have an atypically-shaped saccus and both have a tapered aedeagus; however, the aedeagus is smooth-surfaced in *Semeoloncha* but with numerous thorn-like carinae in *Gentingia*. The female genitalia of *Semeoloncha* are unknown; however, the genitalia of *Gentingia* differ from those of all other Scardiinae in the peculiar shape of the eighth sternite and in the presence of a single U-shaped denticulate signum at the point of inception of the ductus bursae on the corpus bursae.

SEMEOLONCHA Gozmány

Semeoloncha Gozmány, 1968: 332. Type-species: *Semeoloncha penicillata* Gozmány, 1968: 324, by original designation and monotypy.

Diagnosis. Antenna (male) with dorsal cilia, ventral surface scaled; cilia shorter than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) greater than 1·0. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_3 and CuA_1 stalked or very closely approximated at base; ground-colour very pale bronze, with pattern of small, purple-brown marginal spots and larger costal blotch. Male with coremata in eighth abdominal segment; coremata associated with short, lobe-like apodemes at anterior corners of eighth sternite. Male genitalia with complex uncus fused with tegumen; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta simple, entire, not divided medially; vesica with spicular cornuti; aedeagus smooth-surfaced, without spicular carinae.

Conspicuous autapomorphies. Male with eighth tergite reduced, narrow and rod-like, broadening anteriorly, thus T-shaped. Coremata very large, recessed as far as anterior margin of seventh segment; apodeme of valva with strong, arcuate dorsal process arising at one-third from apodeme base and directed caudally.

Distribution. Afrotropical region – Sierra Leone.

Biology. Unknown.

Semeoloncha penicillata Gozmány

(Fig. 44)

Semeoloncha penicillata Gozmány, 1968: 334. Holotype ♂, Sierra Leone (BMNH) [examined].
Semeoloncha penicillata Gozmány; Gozmány & Vári, 1973: 152, fig. 460.

Adult (Fig. 44). ♂, 20 mm. Vertex and frons whitish. Labial palpus whitish, strongly flecked with brown on outer and upper surfaces of first and base of second segment. Maxillary palpus cream, flecked above with brown, short, 5-segmented, not reaching one-half length of second segment of labial palpus. Antenna cream; cilia 0·25 × (♂) flagellar diameter. Thorax and tegula cream, slightly darker anteriorly. Forewing very pale golden or straw-coloured (probably very faded) with small light brown marginal spots, these merged to form a terminal line between R_4 and M_3; larger conspicuous spots just beyond one-half on costa and subtornally. Hindwing pale greyish cream with inconspicuous brown blotches on apical margin. Legs cream; fore-tibia and fore-tarsus marked above with brown but conspicuously pale at articulations; outer mid-tibial spur and outer proximal hind tibial spur 0·7 length of inner spurs.

Genitalia ♂ (Gozmány, 1968: figs 46–48; Gozmány & Vári, 1973: fig. 460). (For description of the caudal region of the abdomen, see 'Remarks'.) Saccus diamond-shaped, almost as long as tegumen + uncus; uncus lobes entirely fused with and subsumed into tegumen, possibly forming the setose caudal margin; tegumen + uncus cowl-shaped, with strongly melanized horn-like lateral processes. Subscaphium not developed. Juxta not developed but anellus swollen to form irregular and microtrichiate lobe at base of each valva; transtilla not developed. Valvae closely appressed (but not fused) basally, lobate, setose; apodemes extraordinarily elongate, each with long and arcuate caudally-directed spike arising from dorsal surface two-thirds from apex. Aedeagus tapered, stout, 7 × as long as broad in middle; apex extended as a narrow tapering band of sclerotization; vesica with minute spicular cornuti (?microtrichia).

Genitalia ♀. Unknown.

Distribution. Sierra Leone.

Biology. Unknown.

Material examined. 2 ex.
Holotype ♂, **Sierra Leone**: vii.1895 (*Clements*) (genitalia slide no. 14997; BMNH).
Sierra Leone: 1 ♂ (paratype), data as holotype but v.1895 (genitalia slide no. 15008; BMNH).

Remarks. When examined originally, both genitalia preparations of this species (only two specimens are known) were very poor. The basal three abdominal segments of the holotype remained attached to the specimen but the remainder of the abdomen had been thrown away, leaving only the badly compressed genitalia and aedeagus on the slide. In the case of the paratype, the terminal two abdominal segments only had been retained; these were damaged and contorted, making the structure impossible to interpret. The genital armature was so badly crushed that it had split longitudinally down the tegumen. Like the holotype, it was grossly overstained. It was thus impossible to determine the structure of the subscaphium, juxta or transtilla, or to code enough information for inclusion of *Semeoloncha* in the numerical analyses. Remounting of both preparations after rehydration, cleaning and differentiating clarified the structure of the diaphragma and details of the seventh and eighth segment. The eighth sternite is broad and the coremata are set in the sternite rather than in the pleural membrane: the dorsal margin of the corematal invagination is strengthened, forming the lateral margin of a dorsal triangular complex consisting of sternite (lateral and outer anterior margins), tergite (medial rod-shaped structure with expanded anterior end) and pleural membrane (region with small spiracle either side of rod-like tergite). This extraordinary structure and the extreme modification of the valval apodeme serve to distinguish *Semeoloncha* from all other scardiine taxa.

CRANAODES Meyrick

Cranaodes Meyrick, 1919: 238. Type-species: *Cranaodes stereopa* Meyrick, 1919: 239, by monotypy.

Diagnosis. Antenna (male) lacking dorsal cilia, ventral surface scaled; cilia longer than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; ground-colour pale bronze, with pattern formed of large purple-brown blotches (but ground-colour paler and blotches more extensive in *oroya*). Male with coremata in eighth abdominal segment; coremata associated with short, lobe-like apodemes at anterior corners of eighth sternite. Male genitalia with complex uncus fused with tegumen; tegumen broken dorsally by at least a membranous suture line; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta simple, entire, not divided medially; vesica lacking spicular cornuti; aedeagus smooth-surfaced, without spicular carinae.

Conspicuous autapomorphies. Forewing pattern consisting of bold purple-brown patches on a pale bronze ground-colour (except in *oroya*).

Distribution. Neotropical region – Colombia, Panama, Peru; Oriental region – Borneo.

Biology. Unknown.

Key to species of *Cranaodes*

Males (males of *sequestrata* are unknown)

1 Dark markings of forewing divided by broad antemedial band of ground-colour (Fig. 45); valva with densely setose medial digitate process on inner surface; costa and ventral margin of valva simple .... ***stereopa*** (p. 98)
– Dark markings of forewing continuous through antemedial region (Fig. 46); inner surface of valva without process; costa and ventral margin of valva strongly folded (Fig. 106).... ***oroya*** (p. 99)

Females (females of *oroya* are unknown)

1 Dark costal blotch on forewing broad, extending posteriorly to middle of cell (Fig. 47); ventral lip of ostium convex (Fig. 159). (Borneo) .... ***sequestrata*** (p. 100)
– Dark costal blotch on forewing narrow, not extending further posteriorly than base of R_5 (Fig. 45); ventral lip of ostium with U-shaped emargination (Fig. 158). (Neotropical region) ***stereopa*** (p. 98)

Cranaodes stereopa Meyrick

(Figs 45, 158)

Cranaodes stereopa Meyrick, 1919: 239. Holotype ♂, Colombia (BMNH) [examined].

Adult (Clarke, 1970: pl. 17, figs 2, 2a, 2b; Fig. 45). ♂, 27 mm; ♀, 40 mm. Vertex and frons brownish yellow. Labial palpus cream, brownish on outer surface, slender, not strongly tufted on second segment.

Maxillary palpus cream, flecked with brown above, relatively short, reaching only about one-half length of second segment of labial palpus. Antennal scape and pedicel light grey-brown; cilia 1·7 × (♂) or 0·5 × (♀) flagellar diameter. Thorax and tegula light yellow-brown, strongly flecked with dark brown anteriorly. Forewing pale bronze marked with strong purple-brown blotches forming a broken irregular postmedial band; quadrate basal blotch continuous with strong basicostal blotch; numerous smaller costal spots. Hindwing light brownish grey. Legs buff, foreleg and mid-leg dark brown above but paler at articulations and across middle of mid-tibia; outer mid-tibial spur 0·6 length of inner; outer hind proximal tibial spur 0·7 length of inner spur.

Genitalia ♂ (Clarke, 1970: pl. 17, figs 2c, 2d). Saccus triangular; uncus lobes entirely fused with outer corners of tegumen, each forming a setose and strongly sclerotized knob-like protuberance with a pair of small apical spines. Subscaphium not developed. Juxta quadrate, strongly sclerotized, transtilla not developed. Valva plain, with strong and setose medial digitate process, apodeme with shallow dorsally-directed flap. Aedeagus stout, 10 × as long as broad in middle, sclerotization of apex a thin tapered process only, ventrally with distinctive subbasal longitudinal 'keel'.

Genitalia ♀ (Fig. 158). Eighth tergite longer than eighth sternite, with three pairs of strong epimarginal setae and numerous scattered (?)microsetae; eighth sternite with broad terminal ostium with strong V-shaped emargination of ventral lip; margin of eighth sternite either side of ostium with compact group of four elongate setae and numerous smaller setae. Antrum short, broadly funnel-shaped, inception of ductus seminalis posterior to anterior margin of eighth sternite. Ductus bursae thick-walled, inner surface rugose, rugosity with distinct transverse pattern that becomes transverse wrinkling further anteriorly. Corpus bursae thin-walled, elongately ovoid; signa absent.

Distribution. Panama; Colombia.

Biology. Unknown.

Material examined. 2 ex.
Holotype ♂, **Colombia**: San Antonio, 5800', xi.1907 (genitalia slide no. JFGC 6645; BMNH).
Panama: 1 ♀, Chiriqui (genitalia slide no. 13109; BMNH).

Remarks. This is one of the largest and most striking Tineidae, its characteristic wing-pattern serving to distinguish it from all other Neotropical species. Similarities to *sequestrata* may be entirely the result of convergence; however, in the absence of further material of *sequestrata* (particularly males) any discussion as to whether or not the two species are really congeneric would be conjectural. They differ in the length of the (female) antennal cilia, in the shape and size of the forewing markings and in the genitalia, *stereopa* having a strong U-shaped emargination of the ventral lip of the ostium (= posterior margin of eighth sternite) and *sequestrata* having a slightly convex margin with considerably more strong and elongate setae than *stereopa*. In both species the ductus bursae has fine transverse wrinkling (= regular constrictions) but in *stereopa* this is represented posteriorly by rugosity with a distinctive transverse pattern. This latter feature may represent the unexpanded state of the ductus prior to copulation and the ductus may assume a regularly constricted form after being expanded. There is a marked difference between the two species in the form of the wall of the ovipositor dorsal to the ostium: in *sequestrata* this wall is ballooned ventrally to form a lobe large enough to close off the ostium, whereas in *stereopa* the ovipositor wall is quite smooth. Similar swellings of the ovipositor wall occur in most Scardiinae but they are not always conspicuous nor, in theory, capable of closing over the ostium (there is no evidence that this is the function of these lobes).

The function and homology of the flap from the valval apodeme of the male of *stereopa* is uncertain. Similar but much more elongate processes are found in *Semeoloncha*. Apodemal processes also occur in the poorly-known genus *Leptozancla* (Robinson, 1976); this is probably also a scardiine taxon but the material available is in such condition as to make precise placement impossible. The apodemal processes of these groups are analogous to some of the modifications of the labides that occur in *Tinissa* (Robinson, 1976) although probably not homologous.

Cranaodes oroya **sp. n.**

(Figs 46, 106)

Adult (Fig. 46). ♂, 26 mm. Coloration and external structure of head similar to *stereopa*. Thorax brownish cream, a few darker scales anteriorly; tegula grey-brown, a few pale scales at margins. Forewing pale bronze (but badly faded) strongly marked with dark brown to form a possibly continuous anterior fascia similar to that of *Daviscardia* species (but specimen very worn); paler spots along costa; conspicuous pale round spots at end of cell and at end of fold. Hindwing light grey-brown. Legs buff, foreleg and mid-leg darker above (very worn); outer mid-tibial spur 0·7 length of inner; outer proximal hind tibial spur 0·75 length of inner spur.

GENITALIA ♂ (Fig. 106). Saccus elongately triangular; uncus lobes similar to those of *stereopa* but forming only a very small pair of hook-shaped processes on the outer corners of the tegumen. Subscaphium not developed. Juxta represented only by ill-defined thickening of anellus; transtilla not developed. Valva with strongly folded costa and ventral margin, otherwise plain, apodeme without flap (but flap of *stereopa* may represent initial development or reduction of costal fold of this species). Aedeagus almost cylindrical, 10 × as long as broad in middle, with triangular membranous zone from base to almost one-third and with similar but shorter zone from apex.

GENITALIA ♀. Unknown.

DISTRIBUTION. Peru.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

Holotype ♂, **Peru**: R. Inambari, La Oroya, 3100′, dry season, ix.1904 (*Ockenden*) (genitalia slide no. 12394; BMNH).

REMARKS. Smaller and with much more extensive dark forewing markings than *stereopa*, *oroya* may also be distinguished by the male genitalia in which the costa and ventral margin of the valva are strongly folded inward. The flap from the valval apodeme of *stereopa* is absent in *oroya* but may form a part of the costal fold. The middle of the valva bears a conspicuous setose digitate process in *stereopa* but is smooth in *oroya*. Although the wing pattern of the two species is strongly divergent, the similarities of the male genitalia (notably in the complex of the uncus lobes plus tegumen) suggest that they are congeneric.

Cranaodes sequestrata Meyrick

(Figs 47, 159, 200)

Craneodes [sic] *sequestrata* Meyrick, 1926: 164. Holotype ♂, SARAWAK (SM, Kuching) [not found – probably destroyed].

ADULT (Robinson, 1984: pl. 6, fig. 4; Fig. 47). ♀, 32 mm. Vertex and frons yellow-brown. Labial palpus pale buff, strongly speckled with dark brown on outer surface, apex pale. Maxillary palpus grey-brown, reaching only about one-half length of second segment of labial palpus. Antennal scape and pedicel pale buff, flecked with dark brown; flagellum pale buff; cilia 1·0 × flagellar diameter. Thorax and tegula off-white, strongly flecked with grey-brown anteriorly, thorax almost entirely dark. Forewing light greenish bronze flecked with pale brown; large quadrate dark brown spot from costa to posterior margin of cell at one-half; basal half of costa flecked with dark brown; dorsum strongly flecked with dark brown (but worn); a few small dark spots at apex and termen. Hindwing pale greyish buff. Legs pale buff; foreleg and mid-leg darker above, mid-tibia with pair of large diffuse blackish spots above; outer mid-tibial spur 0·5 length of inner; outer proximal hind tibial spur 0·6 length of inner spur.

GENITALIA ♂. Unknown.

GENITALIA ♀ (Fig. 159). Eighth tergite longer than eighth sternite, with four pairs of strong terminal setae and numerous scattered smaller lateral setae; eighth sternite forming a protruding ledge that accommodates ostium behind its posterior margin; sternite with 10 pairs of elongate setae and a few smaller setae close to caudal margin. Antrum narrow and cylindrical, ostium closed by bulbous protrusion of ovipositor wall; inception of ductus seminalis just posterior to anterior margin of eighth sternite. Ductus bursae elongate, thin-walled, but with fine and close-set transverse wrinkles, extending beyond apices of apophyses anteriores. Corpus bursae thin-walled, elongately ovoid; signa absent.

DISTRIBUTION. Borneo (Fig. 200).

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

Brunei: 1 ♀, Bukit Pagon, LP 308, 5520′, upper montane forest, 15–20.ii.1982 (*Robinson*) (genitalia slide no. 6981; BMNH).

REMARKS. The female specimen described here agrees well with Meyrick's original description of the male: discrepancies are in the colour of the head ('greyish ochreous'), the ground-colour of the forewing ('prismatic white') and the absence of any mention of dark markings on the dorsum. It is unlikely that Meyrick's holotype of this species, deposited originally in the Sarawak Museum, Kuching, still exists. Exhaustive searches at my request by the present curators (and by workers in the 1950s – Diakonoff, pers. comm.) have failed to turn up any of the material described in Meyrick's 1926 paper. I am reasonably confident that the female described here is of Meyrick's species. On the basis of the characters available from this female there is no reason to exclude *sequestrata* from *Cranaodes*. However, the genitalia do differ substantially from those of *stereopa* (q.v.) and the similarities may be entirely due to convergence.

***PECTINISCARDIA* gen. n.**

Type-species: *Cranaodes prostylias* Meyrick, 1927: 327.

DIAGNOSIS. Antenna (male) with dorsal cilia, ventral surface scaled; cilia longer than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; mottled coloration forming cryptic, coarse 'moss' pattern. Male lacking coremata in eighth abdominal segment. Male genitalia with simple uncus – a pair of setose lobes – fused with tegumen; tegumen broken dorsally by at least a membranous suture line; valva lacking basal setose lobe on inner surface; apex of valva forming ventral hook or hooks, or with spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta simple, entire, not divided medially; vesica with spicular cornuti; aedeagus damaged – presence of carinae uncertain.

CONSPICUOUS AUTAPOMORPHIES. Ventrocaudal margin of valva with strong pectinifer of about 12 spines (this character is paralleled in *Morophaga formosana* and *iriomotensis*).

DISTRIBUTION. Neotropical region – Colombia.

BIOLOGY. Unknown.

Pectiniscardia prostylias (Meyrick) **comb. n.**

(Fig. 48)

Cranaodes prostylias Meyrick, 1927: 327. Holotype ♂, COLOMBIA (BMNH) [examined].

ADULT (Clarke, 1970: pl. 17, figs 2b, 3; Fig. 48). ♂, 27 mm. Vertex and frons cream. Labial palpus cream, flecked on outer surface with brown (but very worn). Maxillary palpus cream flecked with brown, 5-segmented, short, reaching only one-fifth length of second segment of labial palpus. Antennal scape and pedicel pale buff, scape flecked strongly above with brown but distal third cream; pedicel and basal flagellar segments dark brown above; cilia 3·0 × flagellar diameter. Thorax and tegula worn and damaged. Forewing very worn, golden cream patterned with purple-brown; costa and fringe with conspicuous chequering. Hindwing pale cream (worn) with a few scattered darker scales at apex and termen. Legs (worn) pale buff; foreleg and mid-leg marked strongly above and on sides with brown but pale at articulations; mid-tibia with pale oblique medial bar on outer surface; outer mid-tibial spur 0·6 length of inner spur; hind tibial spurs broken.

GENITALIA ♂ (Clarke, 1970: pl. 17, figs 3a, 3b). Saccus elongate, triangular, longer than tegumen + uncus; uncus lobes broad, square-ended. Subscaphium not developed. Juxta shield-shaped, hardly sclerotized; transtilla not developed. Valva an obliquely truncated rectangle, simple except for well-developed pectinifer of about 12 stout spines. Aedeagus 9 × as long as broad; apex damaged but with strong sickle-shaped subapical carina and at least a pair of smaller corniform carinae; vesica with minute spicular cornuti (microtrichia).

GENITALIA ♀. Unknown.

DISTRIBUTION. Colombia.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

Holotype ♂, **Colombia**: Central Cordilleras, 11,800′, xi.1920 (genitalia slide no. JFGC 6646; BMNH).

REMARKS. The holotype of this species is so worn that it is impossible to provide good external characteristics for its recognition. However, the alternated dark and light spots down the costa give it a chequered appearance and this feature is distinctive: it is not nearly so strongly developed in any other New

World scardiine. The forewing pattern is otherwise hard to discern. The apical fascia is certainly pale: the dorsum has lost almost all scales but was probably also pale and the remainder of the wing appears to have been mottled with dark brown. Fresh specimens might resemble *Morophagoides* species such as *iulina*. The male genitalia of *Pectiniscardia* are quite distinctive. A pectinifer is developed otherwise in the Scardiinae only in *Morophaga formosana* and *iriomotensis* and I believe this to be a clear case of convergence.

HORMANTRIS Meyrick

Hormantris Meyrick, 1927: 327. Type-species: *Hormantris astragalopa* Meyrick, 1927: 327, by monotypy.

DIAGNOSIS. Antenna (male) lacking dorsal cilia, ventral surface scaled; cilia longer than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers absent; second segment of labial palpus longer than width of head. Legs damaged – relative lengths of tibial spurs unknown. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; mottled coloration forming cryptic, coarse 'moss' pattern. Male lacking coremata in eighth abdominal segment. Male genitalia with simple uncus – a pair of setose lobes – separated from tegumen by narrow band of membrane; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta simple, entire, not divided medially; vesica with spicular cornuti; aedeagus with spicular or spinose carinae.

CONSPICUOUS AUTAPOMORPHIES. Ventral half of inner surface of valva with dense field of thorn-like setae.

DISTRIBUTION. Neotropical region – Colombia.

BIOLOGY. Unknown.

Hormantris astragalopa Meyrick

(Fig. 49)

Hormantris astragalopa Meyrick, 1927: 327. Holotype ♂, COLOMBIA (BMNH) [examined].

ADULT (Clarke, 1970: pl. 29, figs 1, 1a, 1b; Fig. 49). ♂, 34 mm. Head and thorax almost entirely denuded but some white and brown scales on labial palpus. Maxillary palpus whitish, elongate, 5-segmented. Antennal scape and pedicel whitish with some brown scales; flagellum pale buff-cream; cilia about 8 × flagellar diameter. Forewing almost entirely denuded, pale buff-cream with scattered small brown speckles; slightly larger brown spots on costa; large subapical dark brown spot. Hindwing off-white mottled with pale grey. Foreleg buff strongly flecked with dark brown; other legs lost.

GENITALIA ♂ (Clarke, 1970: pl. 29, figs 1c, 1d). Saccus broad, elongate and strongly sclerotized; uncus lobes small, digitiform, poorly sclerotized, sparsely setose. Subscaphium not developed. Juxta, if present, represented by only slight swelling of anellus; transtilla not developed. Valva almost circular, dorsal half strongly spined on internal surface; ventral margin with rounded triangular flap at one-half and with short, stout basal setose lobe. Aedeagus dumb-bell-shaped with dense spinose carinae on dorsal surface of apical half; vesica with group of eight spine-like cornuti.

GENITALIA ♀. Unknown.

DISTRIBUTION. Colombia.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

Holotype ♂, **Colombia**: Mt Tolima, 12,500′, x.1920 (genitalia slide no. JFGC 6644; BMNH).

REMARKS. *Hormantris* differs from *Cnismorectis* (q.v.) in having a more elongate maxillary palpus; the antennal cilia are considerably longer, the longest of any scardiine known. Unlike *Cnismorectis*, the ventral surface of the antenna is scaled and the pecten is sparse with, apparently, fewer than 15 bristles (but the specimen is worn and the bristle-sockets have not been checked in a microscopic preparation). The holotype of *astragalopa* is so worn as to make impossible any comparison of wing pattern except the observation that the subapical dark brown spot does not occur in *Cnismorectis*.

CNISMORECTIS Meyrick

Cnismorectis Meyrick, 1936: 109. Type-species: *Cnismorectis choritica* Meyrick, 1936: 109, by monotypy.

DIAGNOSIS. Antenna (male) lacking dorsal cilia, ventral surface without scales; cilia longer than 1·5 × flagellar diameter. Scape with more than 15 pecten bristles. Interocular index (male) greater than 1·0. Maxillary palpus with fewer than 5 segments; pilifers absent; second segment of labial palpus longer than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; mottled coloration forming cryptic, coarse 'moss' pattern. Male lacking coremata in eighth abdominal segment. Male genitalia with simple uncus – a pair of setose lobes – separated from tegumen by narrow band of membrane; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta complex, entire, not divided medially; vesica with spicular cornuti; aedeagus smooth-surfaced, without spicular carinae.

CONSPICUOUS AUTAPOMORPHIES. Ventral margins of valvae invaginated, contiguous with juxta which is infolded anteriorly, the whole complex forming a deep, broad pocket; vesica with elongate oval of small, thorn-like cornuti.

DISTRIBUTION. Neotropical region – Peru, Bolivia.

BIOLOGY. Unknown.

Cnismorectis choritica Meyrick

(Figs 50, 105, 160, 182)

Cnismorectis choritica Meyrick, 1936: 109. LECTOTYPE ♀, BOLIVIA (BMNH), here designated [examined].

ADULT (Figs 50, 182). ♂♀, 26–36 mm. Vertex and frons very pale buff with a few dark scales. Labial palpus very pale buff flecked with brown. Maxillary palpus whitish, 4-segmented, very short, not reaching base of second segment of labial palpus. Antennal scape and pedicel ochreous cream flecked with brown, flagellum ochreous cream; cilia 3.0 × (♂) or 0.3 × (♀) flagellar diameter. Thorax and tegula very pale buff flecked with brown. Forewing cream flecked and finely strigulated with orange-brown (particularly along veins) and dark brown, dark markings concentrated to leave ill-defined paler ante- and postmedial fasciae. Hindwing dirty cream strigulated with pale grey. Legs pale buff strongly flecked with brown, particularly above on fore-leg and mid-leg; mid-tibia conspicuously rough-scaled; tarsi ringed with brown; outer mid-tibial spur 0.8 length of inner; outer proximal hind tibial spur 0.6 length of inner spur.

GENITALIA ♂ (Fig. 105). Saccus slender, elongate; uncus lobes slender, small, only slightly sclerotized, setose. Subscaphium not developed. Juxta apparently forming ventral wall of pocket that extends anteriorly behind saccus and extends laterally into ventral margins of valvae; transtilla not developed. Valva almost rectangular with dorsal corner produced into a spatulate lobe; ventral margin invaginated to form conspicuous pocket; internal surface with coarse microtrichia and two or three small peg-like processes (?sensillae) at four-fifths. Aedeagus slender, elongate, 20 × as long as broad in middle, without carinae; base of vesica with elongate oval of small, thorn-like cornuti.

GENITALIA ♀ (Fig. 160). Seventh sternite with corethrogyne of fine, elongate hairs. Eighth tergite slightly longer than eighth sternite, deeply emarginate medially, with two pairs of elongate terminal setae and five pairs of smaller terminal setae. Eighth sternite with deep U-shaped medial emargination accommodating ostium, with dense, stiff, elongate bristles. Antrum narrow, cylindrical, one-third length of apophyses anteriores. Ductus bursae thin-walled, as long as antrum; inception of ductus seminalis close to junction with antrum. Corpus bursae thin-walled, pyriform, twice length of antrum; signa absent.

DISTRIBUTION. Bolivia, Peru.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 5 ex.

Lectotype ♀, **Bolivia**: Santa Cruz, Samaipata, 1500 m, iii (*Steinbach*) (genitalia slide no. 6970; BMNH). **Bolivia**: 1 ♀ (paralectotype), 1934 (*Staudinger*) (BMNH); 1 ♂, 1 ♀, Rio Tanampaya, 1894 (*Garlepp*) (genitalia slide no. 6969; BMNH). **Peru**: 1 ♀, Huanuco, Cushi, 1900 m (*Hoffmann*) (BMNH).

REMARKS. *Cnismorectis* is the sister-group of *Hormantris*. The two are conspicuous in that they have a distinctive mottled pattern on the hindwings and exceptionally elongate labial palpi: both have lost the pilifers. In the male genitalia of both, the uncus lobes are very small and digitiform and the vesica has thorn-like cornuti. The microtrichia on the valva of *Cnismorectis* are, however, replaced functionally by a field of very small thorn-like spines covering the dorsal half of the valva in *Hormantris*.

The relationship of these genera to *Dorata* Busck, a genus of five greyish cream species with plain hindwings from northern Mexico and south-western U.S.A., requires further investigation. Superficially, *Dorata* does not look like a scardiine but, like *Cnismorectis* and *Hormantris*, has elongate labial palpi and lacks pilifers. The uncus lobes are similar to those of *Cnismorectis* but bear strong, thorn-like spines. Similar spines occur on the dorsal lobe of the strongly bifurcated valva which also carries a setose digitate process from the ventral margin in the one species examined (*Dorata atomophora* Meyrick). The ventral lobe of the valva of *Dorata* may represent the juxta: a pouch superficially similar to that of *Cnismorectis* runs anteriorly from the ventral base of the valva. Davis (in prep.) is including *Dorata* in a revision of the North American Tineidae.

MINISCARDIA gen. n.

Type-species: *Scardia minimella* Busck, 1914: 65.

DIAGNOSIS. Antenna (male) lacking dorsal cilia, ventral surface scaled; cilia longer than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) greater than 1·0. Maxillary palpus with fewer than 5 segments; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate: M_3 and CuA_1 stalked or very closely approximated at base; mottled coloration forming cryptic, coarse 'moss' pattern. Male with coremata in eighth abdominal segment; coremata not associated with apodemes. Male genitalia with simple uncus – a pair of setose lobes – fused with tegumen; tegumen unbroken, completely sclerotized dorsally; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta, if present, simple, entire, not divided medially; vesica with spicular cornuti; aedeagus with spicular or spinose carinae.

CONSPICUOUS AUTAPOMORPHIES. None; however, may be recognized by the exclusive combination of moss-like forewing pattern with veins M_3 and CuA_1 stalked or connate – see 'remarks' for *minimella*.

DISTRIBUTION. Neotropical region – Panama, Costa Rica, Guatemala, Brazil; Nearctic region – U.S.A. (Arizona).

BIOLOGY. Unknown.

Miniscardia minimella (Busck) comb. n.

(Figs 55, 56, 111, 165)

Scardia minimella Busck, 1914: 65. Holotype ♂, PANAMA (NMNH) [examined].

ADULT (Figs 55, 56). ♂, 15–19 mm. ♀, 20–25 mm. Vertex and frons orange-brown, with dark brown tufts close to eyes. Labial palpus orange-brown, strongly marked with deep purple-brown on outer surface. Maxillary palpus dull buff, deep purple-brown on upper and outer surfaces, probably 3-segmented, reaching only one-half length of second segment of labial palpus. Antennal scape and pedicel orange-brown, dark purple-brown above; flagellum scales light grey-brown but darker at base of flagellum; cilia 1·5 × (♂) or 0·2 × (♀) flagellar diameter. Thorax and tegula deep purple-brown, thorax with buff-cream transverse band, tegula tipped with buff-cream. Forewing buff-cream, strongly speckled with deep purple-brown, speckling concentrated into basal, medial and subterminal fasciae. All deep purple-brown markings (especially on underside) with pronounced blue-green iridescence when observed at an acute angle. Hindwing light brownish grey. Legs buff, foreleg and mid-leg heavily marked above and at sides with deep purple-brown, but pale at articulations; mid-tibia with pair of conspicuous oblique dark bars on outer surface; hindleg greyish above; outer mid-tibial spur 0·5 length of inner; outer hind proximal tibial spur 0·75 length of inner spur.

GENITALIA ♂ (Fig. 111). Saccus elongate, triangular, more than half length of genital armature; uncus lobes triangular, fused with each other and with tegumen, sclerotized, setose, apices level with apices of valvae. Subscaphium not developed. Juxta not developed or represented only by ill-defined thickening of base of anellus; transtilla not developed. Valva slender, triangular, simple. Aedeagus 7 × as long as broad, with subapical dorsal transverse band of small, thorn-like carinae; vesica with minute spicular cornuti (?microtrichia).

GENITALIA ♀ (Fig. 165). (Description based on examples from French Guiana and Brazil.) Eighth tergite slightly longer than eighth sternite, with about 8 strong setae close to caudal margin and pair of large medial patches of microtrichia; eighth sternite with shallowly m-shaped caudal margin, strongly folded medially to accommodate broad, transverse ostium with convex or slightly concave ventral lip; apex of eighth sternite with two or three pairs of strong setae and numerous short, small setae. Antrum with broad posterior chamber, dorsal surface of chamber with dome-shaped thickening surrounding inception of ductus seminalis; anterior region of antrum a short, smooth-walled, narrow tube reaching less than 0·25 length of apophyses anteriores. Ductus bursae thick-walled posteriorly, with about 15 irregular transverse constrictions, becoming very thin-walled anteriorly. Corpus bursae globular, very thin-walled, extending to 1·25 length of apophyses anteriores; signa absent.

DISTRIBUTION. Guatemala; Costa Rica; Panama; French Guiana; Brazil.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 7 ex.

Holotype ♂, **Panama**: Porto Bello, v.1912 (*Busck*) (genitalia slide no. 20156; NMNH, Washington).

Guatemala: 1 ♂, Poptum, Peten, 15–16.ix.1973 (*Becker*) (coll. Becker, Brasilia). **Costa Rica**: 1 ♂, San Jose, 1922 (genitalia slide no. 12689; BMNH); 1 ♀, 1935 (*H.S.*) (genitalia slide no. 12680; BMNH). **French Guiana**: 1 ♀, Nouvelle Chantier, x. (*Le Moult*) (genitalia slide no. 12684; BMNH); 1 ♀, St Jean du Maroni (*Le Moult*) (BMNH). **Brazil**: 1 ♀, Rio Brilhante, Mato Grosso, 23–27.x.1970 (*Becker*) (coll. Becker, Brasilia).

REMARKS. This species is one of the few Neotropical taxa of Scardiinae that has an olivaceous 'moss' pattern resembling that of the *Morophaga choragella*-group. Other Neotropical taxa with this pattern are *Diataga* (with M_2 and M_3 stalked in the forewing and with very short outer tibial spurs) and *Morophagoides* (all veins free, pattern generally more variegated). In the forewing M_3 and CuA_1 are always stalked or connate; this characteristic is also found in the smaller and darker *Bythocrates* and in *Perilicmetis* with its characteristic dark brown subterminal fascia. The male genitalia are remarkable for their simplicity of structure, the female genitalia for the internal thickened and sclerotized ridge that is the posterior continuation of the apophyses anteriores extending and remaining conspicuous as far posteriorly as the setose apical region of the eighth sternite.

The females listed here may not be conspecific with each other or with the males. A single female from Arizona (see below) appears to be a congener but not conspecific. The female from Brazil has similar genitalia to those of the female from French Guiana but the ventral lip of the ostium is concave in the former and convex in the latter. The broad posterior region of the antrum is much less strongly sclerotized in the Brazilian specimen and the transverse constrictions of the ductus bursae are more numerous, about double the number present in the French Guiana specimen. The female from Costa Rica, with a 5 mm longer wingspan than the other specimens examined, has only 5 pairs of apical setae on the eighth sternite and a broader, shorter antrum lacking the narrow anterior region of the other two examples; the ductus bursae lacks transverse constrictions and the bursa copulatrix, although collapsed in preparation, does not extend beyond the apophyses anteriores.

Miniscardia species A

(Fig. 166)

ADULT. ♀, 17 mm. Coloration and external structure similar to *minimella*.

GENITALIA ♂. Unknown.

GENITALIA ♀ (Fig. 166). Similar to those of *minimella* but ventral lip of ostium not extended as far posteriorly, and with distinct marginal bulbosity; antrum short, not extending anteriorly beyond inception of ductus seminalis; posterior region of ductus bursae distinctly scobinate on external surface; apex of eighth sternite with three pairs of strong setae.

DISTRIBUTION. U.S.A. (Arizona).

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

U.S.A.: 1 ♀, Arizona, Cochise Co., Huachuca Mts, Miller Canyon, 7.viii.1974 (*Powell*) (genitalia slide; UC).

REMARKS. This specimen probably represents a species different from *minimella* but, with only a single female example in poor condition available for examination, its status remains uncertain. The matter is complicated by the apparent variability of females of *minimella*. The example of *minimella* from Costa Rica has genitalia very similar to those of this specimen from Arizona; both lack sclerotization of the ductus bursae to form an antrum anterior to the inception of the ductus seminalis, and in both the ventral lip of the ostium is almost straight, rather than being convex as in examples from Brazil and French Guiana.

NECROSCARDIA gen. n.

Type-species: *Tinea funeratella* Zeller, 1863: 144.

DIAGNOSIS. Antenna (male) lacking dorsal cilia, ventral surface scaled; cilia longer than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) greater than 1·0. Maxillary palpus with fewer than 5 segments; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; pattern consisting of pale termen and dorsum on darker ground-colour. Male with coremata in eighth abdominal segment; coremata associated with elongate, rod-like apodemes at anterior corners of eighth sternite. Male genitalia with complex uncus separated from tegumen by narrow band of membrane; tegumen broken dorsally by at least a membranous suture line; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus wider than long; juxta complex, divided medially; vesica with spicular cornuti; aedeagus with spicular or spinose carinae.

CONSPICUOUS AUTAPOMORPHIES. Apex of tegumen forming a single prong-like or bifid process dorsal to the uncus lobes; juxta enormously enlarged, bipartite, closely appressed to and forming a functional part of the valvae.

DISTRIBUTION. Neotropical region – Venezuela, Colombia, Bolivia.

BIOLOGY. Unknown.

Key to species of *Necroscardia*

1 Pair of cream triangular marks on posterior margin of forewing equal in size (Fig. 54); male without large phylliform setae on eighth sternite; male with dorsal process from tegumen bifid, extending caudally well beyond lobes of uncus (Fig. 109); female seventh sternite with posterior margin strongly emarginated medially, with scattered field of strong, needle-like setae (Fig. 163) .... ***morticina*** (p. 107)

– Proximal cream triangular mark on posterior margin of forewing considerably larger than distal mark which is reduced to a minute spot (Fig. 53); male with two pairs of enormous phylliform setae on posterior corners of eighth sternite (Fig. 110); male with dorsal process from tegumen a single spine, not extending beyond lobes of uncus (Fig. 108); female seventh sternite with posterior margin transverse, lacking needle-like setae .... ***funeratella*** (p. 106)

Necroscardia funeratella (Zeller) **comb. n.**

(Figs 53, 108, 110, 164)

Tinea funeratella Zeller, 1863: 144. LECTOTYPE ♂, VENEZUELA, here designated [examined].

ADULT (Zeller, 1863: pl. 2, fig. 6; Fig. 53). ♂, 20 mm; ♀, 23 mm. Vertex and frons brownish cream, reddish brown near eyes. Labial palpus cream flecked with brown, purple-brown on outer surface but pale at apex, sparsely scaled. Maxillary palpus greyish brown above, paler beneath, short, not as long as second segment of labial palpus, probably 3-segmented. Antennal scape and pedicel greyish brown; flagellum greyish brown cilia 1·7 × (♂) or 0·7 × (♀) flagellar diameter. Thorax and tegula cream, anterior third brown. Forewing purple-brown with cream terminal fascia containing brown speckling and small brown apical and medioterminal spots; costa with a few pale flecks; posterior margin with broad cream spot, large triangular cream spot almost at mid-point, and small cream spot at three-quarters. Hindwing light brownish grey. Legs cream, finely flecked with grey-brown; foreleg and mid-leg grey-brown above and on outer surfaces, tibiae traversed by cream band; articulations pale; outer mid-tibial spur 0·7 length of inner; outer proximal hind tibial spur 0·8 length of inner spur.

GENITALIA ♂ (Figs 10B, 110). Eighth sternite with elongate apodemes reaching anterior margin of seventh sternite, at each posterior corner with one large and one small strong phylliform seta. Saccus broadly triangular, shorter than valvae; uncus lobes minute, setose, but sclerotized and lacking setae at apices, surmounted by spike-shaped caudal process from vinculum almost as long as uncus lobes. Subscaphium not developed. Juxta strongly developed, bipartite, forming pair of tuberculate setose lobes surmounting and appressed basally to valvae; transtilla not developed. Valva short, plain, pyramidal, bearing lobe of juxta on inner surface. Aedeagus small, strongly tapered apically, and with scattered minute thorn-like carinae; vesica with very few minute spicular cornuti.

GENITALIA ♀ (Fig. 164). Seventh sternite unmodified. Eighth tergite longer than eighth sternite, with line of minute setae at posterior margin, five or six pairs of very strong submarginal setae and four or five pairs of conspicuous but minute pits scattered in posterior one-quarter. Eighth sternite and genital tract pathologically deformed in specimen examined: illustrated but not described further here.

DISTRIBUTION. Venezuela; Colombia.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 2 ex.
Lectotype ♂, **Venezuela**: (genitalia slide no. 12379; BMNH).
Colombia: 1 ♀, Sierra del Libano, 6000′, v.1899 (*Smith*) (genitalia slide no. 12396; BMNH).

REMARKS. For differentiation of *funeratella* and *morticina*, see the key above. The female described above resembles the lectotype remarkably closely and I am confident that they are conspecific. Walsingham identified the female as *funeratella* – the specimen bears his determination label.

Necroscardia morticina sp. n.

(Figs 54, 109, 162, 163)

ADULT (Fig. 54). ♂, 21 mm. ♀, 17 mm. Coloration and external structure similar to *funeratella* but apices of second and third segments of labial palpus cream, third segment of ♂ entirely cream; cilia (♀) 3 × flagellar diameter; posterior margin of forewing with pale spots coalesced to form continuous band from base to tornus, spots triangular, of equal size; posterior and terminal cream fascia strongly speckled with purple-brown; outer mid-tibial spur 0·6 length of inner; outer proximal hind tibial spur 0·7 length of inner spur.

GENITALIA ♂ (Fig. 109). Eighth sternite with short, rod-like apodemes reaching posterior margin of seventh sternite. Saccus broadly triangular, shorter than valvae; uncus lobes small, outer corners produced into shallow, setose process, inner posterior margin sclerotized and lacking setae, surmounted by V-shaped process from tegumen that extends well beyond tips of uncus lobes. Subscaphium not developed. Juxta strongly developed, bipartite, forming pair of strong, triangular setose lobes with shallowly serrate dorsocaudal margin appressed to and set in apices of valvae; transtilla not developed. Valva short, plain, half barrel-shaped, with juxta lobe set in top of 'barrel'. Aedeagus slender, apex sclerotized only on one side and duck's bill-shaped, with fine thorn-like carinae at apex; vesica with minute spicular cornuti near inception of ductus ejaculatorius.

GENITALIA ♀ (Figs 162, 163). Seventh sternite rounded caudally, with shallow medial U-shaped emargination, strongly sclerotized, with scattered strong setae. Eighth tergite slightly longer than eighth sternite, with narrowly V-shaped mediocaudal emargination; posterior margin with numerous small setae, five pairs of strong submarginal setae; four or five pairs of scattered pits at four-fifths posteriorly; a few small, scattered setae at one-half. Eighth sternite wrinkled laterally, short, forming strong keel-shaped sterigma with trilobed apex (= ventral lip of ostium); apical one-third of sterigma with 10–12 pairs of strong, elongate setae. Antrum elongate, broad but tapering anteriorly, one-half length of apophyses anteriores, lined with elongate microtrichia; inception of ductus seminalis at posterior extremity of antrum (!). Ductus bursae as long as antrum, with fine transverse constrictions. Corpus bursae thin-walled, ovoid; signa absent.

DISTRIBUTION. Bolivia.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 2 ex.
Holotype ♂, **Bolivia**: Cochabamba, Yungas del Espiritu Santo, 1888–9 (*Germain*) (genitalia slide no. 12395; BMNH).
Paratype. 1 ♀, data as holotype (genitalia slide no. 12406; BMNH).

REMARKS. For differentiation of *morticina* and *funeratella*, see the key above. The female paratype of *morticina* is the only specimen of *Necroscardia* that could be considered to be in even fair conditions. Like the other three specimens, however, the second segment of the labial palpus is not densely scaled as in other scardiine genera with a similar wing-pattern (*Moscardia*, *Scardia*, *Daviscardia*).

TINISSA Walker

Tinissa Walker, 1864: 780; Robinson, 1976 (revision); 1981 (reclassification and additional species). Type-species: *Tinissa torvella* Walker, 1864: 780, by monotypy.

Polymnestra Meyrick, 1927: 331. Type-species: *Polymnestra perilithias* Meyrick, 1927: 331, by monotypy. [Synonymized by Gozmány & Vári, 1973: 85.]

Diagnosis. Antenna (male) lacking dorsal cilia, ventral surface scaled; cilia longer or shorter than flagellar diameter. Scape with more than 15 pecten bristles. Interocular index (male) greater than 1·0. Maxillary palpus short, 3-segmented (but a few species with 5 segments) (Fig. 181); pilifers absent; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; pattern consisting of pale spots or speckles on darker ground-colour. Male with or without coremata in eighth abdominal segment; coremata without associated apodemes. Male genitalia with simple or complex uncus separated from tegumen by narrow band of membrane; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; tegumen broken dorsally by at least a membranous suture line; valvae separate, not fused together ventrally, without longitudinal cleft; saccus wider or narrower than long; juxta complex, entire in most species but narrowed ventrally almost to the point of division; vesica lacking spicular cornuti; aedeagus with or without spinose carinae.

Conspicuous autapomorphies. Hind tibia with apical and subapical tufts of elongate, dark-tipped scales; juxta of male complex, strongly modified and incorporated with valvae to form a functional valvae-juxta complex (as in *Necroscardia*); females of most species with segments VII markedly reduced in length but with extended intersegmental membrane between segments VII and VIII bearing a strong corethrogyne of fine, elongate scales.

Distribution. Afrotropical region; Oriental region; Australian region as far east as the Solomon Is and as far south as Queensland.

Biology. One species has been reared from fungus on bamboo (see Robinson, 1976: 257). Typical habitats are shown in Figs 199 and 200.

Remarks. Further treatment of *Tinissa* is not provided here: descriptions and illustrations of the 34 included species have been provided by Robinson (1976; 1981).

SCARDIELLA gen. n.

Type-species: *Scardia approximatella* Dietz, 1905: 27.

Diagnosis. Antenna (male) with dorsal cilia, ventral surface scaled; cilia longer than 1·5 × flagellar diameter. Scape with fewer than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; mottled coloration forming cryptic, coarse 'moss' pattern. Male lacking coremata in eighth abdominal segment. Male genitalia with complex uncus separated from tegumen by narrow band of membrane; tegumen broken dorsally by at least a membranous suture line; valva lacking basal setose lobe on inner surface; apex of valva not forming ventral hook or hooks, without spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta simple, entire, not divided medially; vesica with spicular cornuti; aedeagus with spicular or spinose carinae.

Conspicuous autapomorphies. Bulbus ejaculatorius of male very large, almost 3 × length of aedeagus; ductus bursae of female with spicular inner surface from two-thirds to nine-tenths posteriorly (this also occurs, probably by convergence, in *Montescardia fuscofasciella*).

Distribution. Nearctic region.

Biology. Unknown.

Scardiella approximatella (Dietz) **comb. n.**

(Figs 52, 107, 161)

Scardia approximatella Dietz, 1905: 27. LECTOTYPE ♂, U.S.A. (NMNH), here designated [examined on author's behalf by D. R. Davis].

ADULT (Dietz, 1905: pl. 1, fig. 8; Fig. 52). ♂♀, 13–16 mm. Vertex and frons cream, tinted with brown around eyes. Labial palpus whitish, strongly flecked with brown on outer surface of second segment and middle of outer surface of third segment. Maxillary palpus whitish, flecked with light brown, 5-segmented, extending to three-quarters length of second segment of labial palpus. Antennal scape, pedicel and flagellum greyish buff, dark brown above, flagellum dark brown above only on basal five or six segments; cilia 2·0–2·5 × (♂) or 0·4 × (♀) flagellar diameter. Thorax and tegula cream, tegula strongly flecked anteriorly with brown, thorax flecked laterally and far anteriorly with brown. Forewing whitish, strongly flecked with light orange-brown, particularly along veins, and patterned with dark brown to form strong medial and basal fasciae and dense spotting over remainder of wing; fringe with medial grey-brown line and irregular chequering. Hindwing pale greyish cream, fringe lighter. Legs pale buff-cream, foreleg and mid-leg strongly marked with dark brown above and on sides (including tarsi) but pale at articulations and with strong whitish bar across mid-tibia; hind tarsus strongly marked above with brown; outer mid-tibial spur 0·6 length of inner; outer proximal hind tibial spur 0·7 length of inner spur.

GENITALIA ♂ (Fig. 107). Saccus elongate, triangular; uncus lobes a pair of digitiform processes, widely separated, strongly sclerotized. Subscaphium broad but represented only by slight thickening of diaphragma. Juxta represented only by almost imperceptible thickening of anellus; transtilla not developed. Valva short, rounded, with strong basicostal digitate process. Aedeagus stout, 7 × as long as broad, with shallowly triangular subapical carinae and numerous minute scattered thorn-like carinae; vesica with minute spicular cornuti (microtrichia); bulbus ejaculatorius very long, almost 3 × length of aedeagus.

GENITALIA ♀ (Fig. 161). Eighth tergite longer than eighth sternite, with three pairs of strong subapical setae; eighth sternite with strongly developed sterigma accommodating short, cylindrical antrum; eighth sternite quadrangular caudal to sterigma, hardly sclerotized, with two pairs of strong setae and 12–15 pairs of scattered smaller setae; ventral lip of ostium strongly concave. Antrum not extending beyond anterior margin of eighth sternite. Ductus bursae elongate, 1·5 × length of apophyses anteriores, lined with stout microtrichia anterior to inception of ductus seminalis at level of one-half length of apophyses anteriores (i.e., short length of ductus bursae posterior to ductus seminalis is without microtrichia). Corpus bursae pyriform, continuous with ductus, thin-walled; signa absent.

DISTRIBUTION. U.S.A.: Pennsylvania, New Jersey, District of Columbia, Maryland, Ohio (Dietz, 1905); New York; Massachusetts, Georgia (Forbes, 1923). Canada: Toronto.

BIOLOGY. The larva has been found in a rotten sycamore log (Forbes, 1923).

MATERIAL EXAMINED. 5 ex.

Lectotype ♂, **U.S.A.**: Maryland, Plummer's Island, vii.1901 (*Busck*) (NMNH) [examined on author's behalf by D. R. Davis].

U.S.A.: 1 ♀ (paralectotype), Pennsylvania, Hazleton, 15.vii.1896 (*Dietz*) (BMNH); 1 ♀, New York, Fishers, 21.vii.1933 (*Klots*) (genitalia slide no. 12403; BMNH). **Canada**: 3 ♂, Toronto, vi.1922 (*Parish*) (genitalia slide no. 12402; BMNH).

REMARKS. This small species is very distinctive. Its pattern is lighter than that of all other North American scardiines and resembles more that of a nemapogonine. The antennal cilia of the male are extraordinarily long: few other Scardiinae have cilia more than twice as long as the diameter of the flagellar segments. The strongly patterned hind tarsi are also characteristic: they are pale in most other scardiines. *Scardiella* appears to be a 'primitive' taxon. It has only six apomorphies (Table 1) and its affinities are obscure. Its apomorphic features are its elongate antennal cilia, absence of coremata, complex uncus, dorsally discontinuous tegumen, sparse setal patch on the second abdominal sternite, and its basicostal process on the valva. This last has been scored as a 'basal setose lobe' in Table 1, homologous with that of *Morophaga*, *Amorophaga* and *Diataga*. However, I believe it is an independent development and it is not included in the generic diagnosis. *Afroscardia* also has a setose lobe and this has been scored similarly; the lobe is subcostal and situated far distad on the valva. It seems unlikely that it is homologous with that of *Scardiella*. The affinity of the two taxa suggested by numerical analysis is, in all probability, due to convergence.

AFROSCARDIA gen. n.

Type-species: *Polymnestra capnochalca* Meyrick, 1932*b*: 207.

DIAGNOSIS. Antenna (male) with dorsal cilia, ventral surface scaled; cilia longer than 1·5 × flagellar diameter. Scape with more than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus with fewer than 5 segments; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 separate; M_2, M_3 and CuA_1 separate; mottled coloration forming cryptic, coarse 'moss' pattern. Male lacking coremata in eighth abdominal segment. Male genitalia with simple uncus – a pair of setose lobes – fused with tegumen; tegumen broken dorsally by broad, membranous region; valva lacking basal setose lobe on inner surface; apex of valva forming ventral hook or hooks, or with spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta simple, entire, not divided medially; vesica lacking spicular cornuti; aedeagus with spicular or spinose carinae.

CONSPICUOUS AUTAPOMORPHIES. Sclerotization of tegumen interrupted dorsally by broad membranous region between lateral arms of tegumen; lobes of uncus fused with tegumen so that genital armature terminates dorsocaudally in a pair of widely separated lobes.

DISTRIBUTION. Afrotropical region – Uganda.

BIOLOGY. Unknown.

Afroscardia capnochalca (Meyrick) comb. n.

(Fig. 51)

Polymnestra capnochalca Meyrick, 1932*b*: 207. Holotype ♂, UGANDA (BMNH) [examined].

ADULT (Fig. 51). ♂♀, 18–20 mm. Vertex and frons purple-brown. Labial palpus purple-brown, second segment white on inner surface and on apex of ventral tuft. Maxillary palpus whitish, very short, 3-segmented. Antennal scape, pedicel and flagellum dark brown, paler beneath and on pecten; cilia 2·0 × (♂) or 0·8 × (♀) flagellar diameter. Thorax and tegula purple-brown. Forewing uniformly purple-brown with violet iridescence, apex slightly paler; fringe yellow. Hindwing greyish brown, fringe yellowish. Legs ochreous buff, dark brown above and on sides; outer mid-tibial spur 0·6 length of inner; outer proximal hind tibial spur 0·75 length of inner spur.

GENITALIA ♂ (Gozmány & Vári, 1973: fig. 451). Saccus elongate, tapered, longer than tegumen + uncus; uncus lobes flap-like, small, widely separated, only weakly sclerotized; transtilla not developed. Valva elongately triangular with slightly hooked apex, with small subcostal setose lobe at two-thirds. Aedeagus slender, elongate, more than 15 × as long as broad, with very fine spicular subapical carinae; vesica without cornuti.

GENITALIA ♀. Unknown.

DISTRIBUTION. Uganda (Ruwenzori Mts).

BIOLOGY. Unknown.

MATERIAL EXAMINED. 5 ex.

Holotype ♂, **Uganda**: [Ruwenzori Mts], Bujubis, 12,000′, 16.viii.1931 (*Hancock*) (genitalia slide no. 10264; BMNH).

Uganda: 1 ♀ (paratype) (abdomen missing), Ruwenzori Mts, 10,000′, viii.1931 (*Hancock*) (BMNH); 1 ♂, Ruwenzori Range, Bigo, 11,400′, 29.vii.1952 (*Fletcher*) (BMNH); 2 ♂, Ruwenzori Range, heath zone above Nyamgasani Valley, 12–13,000′, xii.1934–i.1935 (*Buxton*) (BMNH).

REMARKS. This is the only scardiine that has an entirely plain-coloured forewing. It resembles superficially *Bythocrates* from the New World, but in that genus the fringes are concolorous with the forewing and there is a row of pale spots along the costa. *Afroscardia* is distinctive also in that, despite its having a complete venation (although R_4 and R_5 are connate), it is very narrow-winged, the forewing more than four times as long as broad. The only other scardiine genus with the wings so slender is *Diataga*. The male genitalia of *Afroscardia* are distinctive in that the tegumen is broken dorsally by a membranous zone and the uncus lobes are widely separated: the terminal arms of the tegumen are strongly sclerotized and rod-like.

AMOROPHAGA Zagulajev

‡*Amorophaga* Zagulajev, 1966: 634. [Nomen nudum.]
Amorophaga Zagulajev, 1968: 329. Type-species: *Amorophaga hyrcanica* Zagulajev, 1968: 331, figs 1, 2, by original designation and monotypy.

DIAGNOSIS. Antenna (male) lacking dorsal cilia, ventral surface without scales; cilia longer than 1·5 × flagellar diameter (but shorter in *hyrcanica*). Scape with more than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with R_3 and R_4 stalked or very closely approximated at base; M_2, M_3 and CuA_1 separate; pattern elements consisting of greyish or olivaceous longitudinal streaks on a paler background. Male with coremata in eighth abdominal segment; coremata without associated apodemes. Male genitalia with complex uncus separated from tegumen by narrow band of membrane; tegumen broken dorsally by at least a membranous suture line; valva with setose basal lobe on inner surface; apex of valva forming ventral hook or hooks, or with spines; valvae separate, not fused together ventrally, with deep emargination forming longitudinal cleft; saccus wider than long; juxta complex, divided medially; however, juxta simple and undivided in *cryptophori*; vesica lacking spicular cornuti; aedeagus with spinose carinae (but not in *cryptophori*).

CONSPICUOUS AUTAPOMORPHIES. Wing pattern composed of longitudinal streaks.

DISTRIBUTION. Holarctic – U.S.S.R. (Azerbaidjan), Nepal, Japan, U.S.A. (Idaho, California).

BIOLOGY. See *Amorophaga cryptophori* (Clarke).

Key to species of *Amorophaga*

Males (males of *rosemariae* are unknown)

1 Antennal cilia shorter than 1·5 × flagellar diameter; uncus broad, short, with pair of small lateral ventrally-directed hooks .... ***hyrcanica*** (p. 113)
– Antennal cilia longer than 1·5 × flagellar diameter; uncus narrow, elongate, without lateral hooks 2
2 Uncus with pair of strong, curved processes directed ventrally and caudally and resembling a gnathos. (western U.S.A.) .... ***cryptophori*** (p. 112)
– Uncus lacking any ventrally-directed processes (Fig. 112). (Japan) .... ***japonica*** (p. 114)

Females (females of *hyrcanica* and *japonica* are unknown)

1 Forewing ground-colour cream (with olivaceous tint when fresh), strongly marked with orange-buff and dark brown, overall appearance olivaceous (Fig. 57); outer mid tibial spur only about 0·3 length of inner spur; frenulum with two bristles; seventh sternite with posterior margin strongly sclerotized and serrated (Fig. 168). (Nepal) .... ***rosemariae*** (p. 111)
– Forewing ground-colour very pale grey, lightly marked with brownish grey, overall appearance greyish (Figs 58, 59); outer mid tibial spur one-half length of inner spur; frenulum with about six bristles; seventh sternite with smooth and only lightly sclerotized posterior margin. (western U.S.A.) .... ***cryptophori*** (p. 112)

Amorophaga rosemariae sp. n.

(Figs 57, 167, 168, 198)

ADULT (Fig. 57). ♀, 23, 29 mm. Vertex and frons whitish, scales greyish brown basally. Labial palpus whitish, most scales of second segment tipped with blackish brown; third segment with elongate brown spot on outer surface. Maxillary palpus whitish, second and third segment with dark brown scales above. Antennal scape and pedicel pale buff, scape with a few dark dorsal scales; flagellum pale buff; cilia 1·0 × flagellar diameter. Thorax and tegula whitish, strongly flecked with brown. Forewing cream marked with orange-buff (particularly along veins) and dark brown; overall appearance olivaceous in fresh specimen but rapidly becoming brownish; pattern similar to that of *Morophaga choragella* but disrupted by longitudinal streaking; conspicuous dark spots at two-thirds of costa and in middle of posterior margin. Legs dull buff speckled with brown; foreleg and mid-leg strongly speckled with brown above, but all legs paler at articulations; outer mid-tibial spur 0·3 length of inner; outer proximal hind tibial spur 0·6 length of inner spur.

GENITALIA ♂. Unknown.

GENITALIA ♀ (Figs 167, 168). Seventh sternite with strongly serrated and sclerotized posterior margin and with small V-shaped medial emargination. Eighth tergite narrow, shallowly bilobed posteriorly, with about 10 strong marginal setae and numerous smaller scattered marginal and submarginal setae; eighth sternite almost square in ventral view but extended laterally dorsad to almost meet the narrow tergite; ostium transverse, sternite transversely ridged to either side and extended caudally and inwardly to form pair of terminal lobes posterior to ostium, each bearing three strong setae and numerous smaller setae. Antrum smooth-walled to one-half length of sternite then strongly folded longitudinally anterior to inception of ductus seminalis, reaching two-thirds length of apophyses anteriores. Ductus bursae as long as antrum, very thin-walled, contiguous with corpus bursae which is elongately ovoid and thin-walled; signa absent.

DISTRIBUTION. Nepal.

BIOLOGY. Unknown. The holotype was collected at mercury-vapour light at about 2100 hrs in primary montane Himalayan oak forest (Fig. 198). The paratype was collected some 800 m lower down the same ridge, in the *Schima-Castanopsis* zone.

MATERIAL EXAMINED. 2 ex.

Holotype ♀, **Nepal**: Kathmandu district, Phulchoki, 2700 m (8800′), 28.v.1983 (*Robinson et al.*) (genitalia slide no. 6994; BMNH).

Paratype. **Nepal**: 1 ♀, data as holotype but 1950 m, mixed *Schima-Castanopsis* forest, 19.vi.1984 (*Allen*) (BMNH).

REMARKS. The generic placement of this species must be considered somewhat doubtful. *A. rosemariae* exhibits similarities to species of the *Morophaga choragella*-group (wing pattern; eighth sternite extended dorsally; antrum elongate and strongly folded) but differs sufficiently (in disruption of pattern and in laterocaudal extension of the eighth sternite) to make doubtful its attribution to that group. In placing it in *Amorophaga*, considerable weight is given to the wing-pattern. Such streaking of a recognizable pattern does not occur elsewhere in the Scardiinae and may represent a stage in the transformation of the *Morophaga*-type pattern to the markedly derived streaked pattern of the other three *Amorophaga* species. This is the only species of scardiine in which the caudal margin of the seventh sternite in the female is serrated.

The remaining three species of *Amorophaga* (*hyrcanica*, *cryptophori* and *japonica*) have a similar pale, streaked wing-pattern but that of *hyrcanica* is the palest and the most noticeably brown-tinted. The pattern of *cryptophori* is distinctly grey, that of *japonica* greyish brown (although both specimens of *japonica* are faded). The four species of *Amorophaga* are allopatric. A tentative phylogeny for the genus would have *hyrcanica* and *japonica* as sister-groups (synapomorphies: pale wing-pattern, ventrocaudal hook on valva, short, stout aedeagus), *cryptophori* the sister-group of *hyrcanica* + *japonica* (synapomorphy: wing-pattern) and *rosemariae* the sister-group of these three.

***Amorophaga cryptophori* (Clarke) comb. n.**

(Fig. 58)

Morophaga cryptophori Clarke, 1940: 114. Holotype ♂, U.S.A. (NMNH) [not examined].

ADULT (Clarke, 1940: figs 2 [head], 3–3b [venation]; Fig. 58). ♂♀, 23–29 mm. Vertex and frons light greyish brown, all scales tipped with white. Labial and maxillary palpus coloured similarly. Antennal scape and pedicel light greyish brown, all scales tipped with white; pecten bristles darker brown, tipped with white; flagellum greyish brown, scales tipped with white; cilia 3 × (♂) or 1·0 × (♀) flagellar diameter. Thorax and tegula as head. Forewing very pale grey; strong speckles of brownish grey forming irregular longitudinal streaks, some darker marks at end of cell, and conspicuously barred termen and fringe. Hindwing pale grey. Legs brownish grey (but hind femur and tibia paler), paler beneath and at articulations above; fore- and mid-tibiae banded above with white at base and middle; outer mid-tibial spur 0·5 length of inner; outer proximal hind tibial spur 0·7 length of inner spur.

GENITALIA ♂ (Clarke, 1940: figs 1–1b, 5). Saccus very broad, 1·3 × as wide as long, and shorter than valvae or uncus; uncus lobes slender, digitiform, setose, anteriorly infolded ventrad to form pair of caudally-directed hooks resembling the two halves of a gnathos. Subscaphium slender, well-sclerotized, rod-like. Juxta elongately ovate, transversely wrinkled, rugose, moulded round anellus; transtilla not developed. Valva divided by longitudinal cleft into spatulate dorsal lobe and shorter, broader ventral lobe with irregularly dentate ventral margin and similarly dentate mediolongitudinal ridge converging with ventral margin close to base; base of valva with broad, setose ventral lobe. Aedeagus stout, 8 × as long as broad at one-half, tapered and only sclerotized on dorsal surface from one-half, lacking carinae; vesica without cornuti.

Genitalia ♀ (Clarke, 1940: figs 4, 4a). Eighth tergite with strongly trilobed posterior margin, with about 12 strong marginal setae and similar number of smaller setae; eighth sternite strongly sclerotized, ostium at a little beyond one-half, flanked by pair of short lobes, each with four or five strong setae and similar number of smaller setae; sternite produced into large, conspicuous caudal flap to side of each lobe. Antrum 1·5 × length of eighth sternite, transversely ridged close to ostium just anterior to inception of ductus seminalis at four-figths posteriorly; sides of antrum weakly folded ventrad in anterior third. Ductus bursae as long as antrum, very thin-walled. Corpus bursae almost spherical, very thin-walled; signa absent.

Distribution. U.S.A. (Idaho, California).

Biology. The type-series was reared from *Cryptophorus* (= *Polyporus*) *volvatus* (Clarke, 1940). Lawrence & Powell (1969: 43) recorded *cryptophori* from the same fungus associated with *Abies* and *Pinus* in several scattered localities in California. They considered this to be the only Californian scardiine that is host-specific.

Material examined. 4 ex.
U.S.A.: 1 ♂, 3 ♀, California, El Dorado Co., Blodgett Forest, 13 m. E. of Georgetown, reared from *Polyporus volvatus* coll. 9.vii.1967, em. 23–26.vii.1967 (*Turner*) (BMNH).

Remarks. The wing-pattern of this species is similar only to those of the Old World species *hyrcanica* and *japonica*. The male genitalia differ conspicuously in the structure of the uncus lobes which are extended ventrally and caudally to form a striking imitation of a gnathos (a structure absent in the Scardiinae).

Amorophaga hyrcanica Zagulajev

Amorophaga hyrcanica Zagulajev, 1968: 331, figs 1, 2. Holotype ♂, U.S.S.R. (ZI) [examined].

Adult (Zagulajev, 1973: fig. 98). ♀, 21, 23 mm. (For full description, see Zagulajev (1968: 331, or 1973: 118).) Antennal cilia 1·0 × (♂) flagellar diameter. Forewing with R_3 and R_4 only approximated at base, cream patterned with diffuse longitudinal streaks of light purplish brown, conspicuous dark brown costal and terminal spots, strong basal streak and more diffuse subtornal blotch at three-quarters of posterior margin. Hindwing cream, darker marginal spots at ends of veins. Outer mid-tibial and outer proximal hind tibial spurs 0·5 length of inner spurs.

Genitalia ♂ (Zagulajev, 1968: fig. 2; 1973: fig. 99). Saccus broad, as wide as or wider than long, as long as tegumen + uncus; uncus lobes almost fused in dorsal mid-line, inturned ventrad and strongly sclerotized laterally to form pair of blunt, ventrally-directed hooks. Valva with elongate, digitiform costal process extending well beyond uncus or ventral region of valva; ventral region bilobed, ventral lobe inturned, blunt, hook-like; base of valva with broad, setose membranous lobe; small, digitate process from middle of valva. Aedeagus about 6 × as long as broad at mid-length, as long as genital armature (excluding costal process of valva).

Genitalia ♀. Unknown.

Distribution. U.S.S.R. (Azerbaidjan).

Biology. Unknown.

Material examined. 2 ex.
Holotype ♂, **U.S.S.R.**: Azerbaidjan, Talysh, Astara dist., R. Lyakar, district of Mamagon Village (22 km W. of Pensar), 2000 m, 10.viii.1962 (*Zagulajev*) (ZI).
1 ♂ (paratype), data as holotype but Alashya Village, ix.1962 (ZI).

Remarks. The antennal cilia of male *hyrcanica* are shorter than those of *cryptophori* or *japonica* (males of *rosemariae* are unknown) and the genitalia are distinctive; the other two species have the costal lobe of the valva flattened and smaller, and the uncus lobes are of different form (produced ventrally and caudally to form a passable copy of a gnathos – *cryptophori* – or tapered with subapical 'thorns' – *japonica*). See 'Remarks' for *A. rosemariae* for further comments.

Amorophaga japonica sp. n.

(Figs 59, 112)

Adult (Fig. 59). ♂, 22 mm – holotype, 23 mm – paratype. (Both specimens faded.) Vertex and frons very light brown, scales strongly tipped with white. Labial palpus and maxillary palpus coloured similarly. Antennal scape and pedicel with scales light brown basally, otherwise whitish; flagellum whitish; cilia 2·5 × flagellar diameter. Thorax and tegula light brown, scales tipped with white. Forewing white, strongly speckled with light brown to form irregular longitudinal streaks and conspicuously barred termen and fringe. Hindwing light brownish grey. Legs light brown; foreleg and mid-leg darker above; all legs whitish at articulations; mid-tibia entirely whitish except for oblique brown streak on outer surface; outer mid-tibial spur and outer proximal hind tibial spur 0·7 length of inner spurs.

Genitalia ♂ (Fig. 112). Saccus short, 1·5 × as broad as long; uncus lobes triangular, strongly sclerotized, setose, each with pair of small, subapical thorn-like projections. Subscaphium broad, tapered caudally. Juxta ill-defined, weakly sclerotized, ovate, moulded round anellus; transtilla not developed. Valva with short, setose costal lobe (probably homologous with dorsal lobe of *cryptophori* and costal process of *hyrcanica*) not reaching apex of valva; ventral (conspicuous) lobe of valva tapered and slightly hooked apically, with three small subapical thorn-like processes; ventral margin with strong dorsally-directed spine at two-thirds; base of valva with broad, setose, membranous lobe. Aedeagus stout, 7 × as long as broad, with elongate membranous channel extending dorsally from apex almost to base; apical quarter with fine, spicular carinae; vesica without cornuti.

Genitalia ♀. Unknown.

Distribution. Japan.

Biology. Unknown.

Material examined. 2 ex.
Holotype ♂, **Japan**: 1886 (*Pryer*) (genitalia slide no. 13354; BMNH).
Paratype. **Japan**: 1 ♂, Tottori, Daisen, 9–11.vii.1964 (*Takahama*) (coll. S. Moriuti, Osaka).

Remarks. This species is superficially similar to *hyrcanica* and *cryptophori*. It has a finer and more greyish wing-pattern then *hyrcanica* but, from the limited material available, is not separable by external characteristics from *cryptophori*. The male genitalia differ in the extremely short costal process (dorsal lobe) of the valva being shorter than the ventral lobe of the valva: it is longer in the other two species. The uncus lobes are characteristic in all three species – modified to form a gnathos-like pair of processes in *cryptophori*, square-tipped and inturned to form a pair of small hooks in *hyrcanica* and elongately triangular with subapical 'thorns' in *japonica*.

DIATAGA Walsingham

Diataga Walsingham, 1914: 374. Type-species: *Diataga leptosceles* Walsingham, 1914: 375, pl. 10, fig. 26, by original designation and monotypy.

Diagnosis. Antenna (male) lacking dorsal cilia, ventral surface without scales; cilia longer than 1·5 × flagellar diameter. Scape with more than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs <0·4 length of inner spurs. Forewing with R_3 and R_4 stalked or very closely approximated at base; M_2 and M_3 stalked or very closely approximated at base; mottled coloration forming cryptic, coarse 'moss' pattern. Male with coremata in eighth abdominal segment; coremata associated with elongate, rod-like apodemes at anterior corners of eighth sternite. Male genitalia with simple uncus – a pair of setose lobes – separated from tegumen by narrow band of membrane; tegumen unbroken, completely sclerotized dorsally; valva with setose basal lobe on inner surface; apex of valva forming ventral hook or hooks, or with spines; valvae separate, not fused together ventrally, without longitudinal cleft; saccus longer than wide; juxta complex, divided medially; vesica with spicular cornuti; aedeagus smooth-surfaced, without spicular carinae.

Conspicuous autapomorphies. Two pairs of veins fused, stalked or connate in forewing; M_2 and M_3 stalked or very closely approximated at base in forewing; aedeagus bifurcated from close to base, dorsal arm with apex swollen; juxta bifid, forming pair of strongly defined lobes either side of anellus, and closely associated with basal setose lobes of valvae.

Distribution. Neotropical region; Nearctic region – Arizona only.

Biology. See *Diataga leptosceles* Walsingham.

Key to species of *Diataga*

Males (males of *direpta* are unknown)

1 Uncus less than half as long as vinculum + tegumen, with pair of laterobasal spines (Fig. 120); saccus quadrangular, with concave anterior margin .... ***mercennaria*** (p. 119)
– Uncus more than half as long as vinculum + tegumen, without spines; saccus triangular, with sharply convex anterior margin 2
2 Valva cleft to form hook-tipped ventral lobe (Fig. 115) .... ***frustraminis*** (p. 116)
– Valva entire 3
3 Dorsal process of aedeagus markedly shorter than ventral arm (only two thirds-length of corresponding section of ventral arm) (Fig. 123) .... ***brasiliensis*** (p. 117)
– Dorsal process of aedeagus almost as long as or longer than ventral arm (more than 0·85 length of corresponding section of ventral arm) 4
4 Apex of dorsal process of aedeagus bifid (Fig. 124) .... ***compsacma*** (p. 118)
– Apex of dorsal process of aedeagus rounded 5
5 Valva with single elongate digitate process tipped with short fine spines (Fig. 118) ***levidensis*** (p. 118)
– Valva with three shallow thorn-like protuberances without spines (Figs 113, 114) ***leptosceles*** (p. 115)

Females (females of *compsacma*, *brasiliensis*, *frustraminis* and *levidensis* are unknown).

1 Eighth sternite explanate either side of and slightly anterior to ostium; dorsal margin of ostium with deep, U-shaped emargination (Fig. 170) .... ***mercennaria*** (p. 119)
– Eighth sternite evenly tapered to ostium; dorsal margin of ostium either not emarginate or only shallowly concave 2
2 Membrane of ovipositor dorsal to ostium with strong transverse ridging; eighth tergite extending beyond level of ostium (Fig. 169) .... ***leptosceles*** (p. 115)
– Membrane of ovipositor dorsal to ostium smooth; eighth tergite not reaching level of ostium (Fig. 171) .... ***direpta*** (p. 120)

Diataga leptosceles Walsingham

(Figs 60, 113, 114, 121, 169, 183, 185–188, 193–197)

Diataga leptosceles Walsingham, 1914: 375. LECTOTYPE ♂, Mexico (BMNH), here designated [examined].

Adult (Walsingham, 1914: pl. 10, fig. 26 (colour); Figs 60, 183). ♂♀, 17–34 mm. Vertex and frons cream, streaked with brown close to eyes. Labial palpus cream flecked with light brown, whitish on inner surface, densely flecked with brown on upper surface of second segment. Maxillary palpus cream, densely flecked with brown above on second segment. Antennal scape and pedicel cream, densely flecked above with light brown; flagellum light buff; cilia 2·5 × (♂) flagellar diameter (females examined all have the antennae missing). Thorax whitish flecked with brown; tegula brown with a few white scales. Forewing densely mottled medium and dark brown, with a few scattered pale scales; termen with black spots edged with cream between veins; costa with rectangular cream spot at one-half, and one at three-quarters, smaller and inconspicuous white spots closer to apex. Hindwing dark grey. Legs cream, strongly flecked with brown above and at sides, more lightly below, but hind tarsus pale; outer mid-tibial and outer proximal hind tibial spur 0·25 length of inner spurs.

Genitalia ♂ (Figs 113, 114, 121). Saccus slender, elongate, twice as long as broad; uncus lobes slender, elongate, 0·40 length of genital armature, moderately sclerotized, setose. Subscaphium elongate, ribbon-like. Juxta with collar-shaped base, forming pair of lateral shark's fin-shaped lobes with slightly ballooned membranous internal surface; transtilla collar-shaped, closely associated with setose and spinose lobes at bases of valvae. Valva with triangular process close to ventral margin, a further rounded or triangular process just dorsal to this, and a rounded or triangular process nearer to apex. Aedeagus with conspicuous mushroom-shaped dorsal arm extending well beyond ventral arm (aedeagus proper).

Genitalia ♀ (Fig. 169). Eighth tergite narrow, elongate, with pair of subapical groups of setae, each consisting of 4–5 large and similar number of small setae; eighth sternite forming strongly developed sterigma, ostium apical and flanked either side by pair of large setae plus 4–5 small setae; membrane of ovipositor dorsal to sterigma with strong transverse wrinkles. Antrum twice length of eighth sternite, inception of ductus seminalis at two-thirds posteriorly. Ductus bursae broadening gradually into pear-shaped corpus bursae that extends to 1·25 length of apophyses anteriores; signa absent.

DISTRIBUTION. (?)U.S.A. (Arizona – Lawrence & Powell, 1969); Mexico; Costa Rica; Ecuador; Trinidad; French Guiana; Brazil; Peru.

BIOLOGY. Lawrence & Powell (1969: 44) record this species from *Daedalea microsticta* in Mexico and (identified tentatively) from *Polyporus vulpinus* on *Populus fremontii* in Arizona. Becker (pers. comm.) has bred this species from a 'polyporus' in Costa Rica; larvae and pupae from this rearing are figured here (Figs 185–188, 193–197). For notes on larvae and pupae of this species, see 'Biology' for the Scardiinae, above.

MATERIAL EXAMINED. 14 ex.

Lectotype ♂, **Mexico**: Vera Cruz, Jalapa, 1895 (*Schaus*) (genitalia slide no. 12409; BMNH).

Mexico: 1 ♀, data as lectotype but 1897. **Ecuador**: 1 ♂, (*Joannis*). **Trinidad**: 1 ♂ (abdomen missing), vi.1905 (*Busck*). No data: 1 ♂. (All BMNH; all paralectotypes.) **Costa Rica**: 1 ♂, 1 ♀, Turrialba, 600 m, 6.iv.1975, 5.viii.1971 (*Becker*) (coll. V. O. Becker, Brasilia); 2 ♂, 3 pupae, 3 larvae, Turrialba, 25.v.1972 [bred from a fungus] (*Becker*) (coll. V. O. Becker, Brasilia). **French Guiana**: 1 ♂, Nouvelle Chantier, iv. (*Le Moult*) (BMNH). **Brazil**: 1 ♂, Amazonas, Prainha, at light, 17.xii.1873 (*Trail*) (BMNH); 1 ♂, Teffe, xii.1919 (*Parish*) (BMNH); 1 ♂, Sta Catarina, Brusque, 6.ix.1970 (*Becker*) (coll. V. O. Becker, Brasilia). **Peru**: 1 ♂, Pacaya, vi.1912 (*M.*) (BMNH).

REMARKS. One male paralectotype of *leptosceles* is not of this species but is referable to *frustraminis* (*q.v.*), the only other *Diataga* known that is dark-winged and almost patternless. *D. leptosceles* may be separated from *frustraminis* by its pale costal markings on the forewing (absent in *frustraminis*) and brown tegulae (whitish in *frustraminis*). The remaining species of *Diataga* are pale (*brasiliensis*, *compsacma*, *levidensis*, *mercennaria*) or have a strongly developed pattern (*direpta*) reminiscent of that of *Morophaga choragella*.

The male genitalia of specimens from French Guiana and Brazil differ slightly from those of the lectotype from Mexico in that the costa of the valva is emarginate close to the apex and the two dorsal processes of the valva are pointed rather than rounded. The significance, if any, of this regional variation may become clearer when further material is available. At present I consider the two genital types to represent a single species. The dorsal process of the aedeagus, and the form of the valva, differ from that exhibited by other *Diataga* species (compare illustrations). The male genitalia of *leptosceles* differ from *frustraminis* in lacking a ventrally hooked valva (compare illustrations) and in the form of the aedeagus; this has the dorsal process mushroom-shaped in *leptosceles* but spatulate and hooked in *frustraminis*. The apex of the aedeagus proper (the ventral arm of the aedeagus) is obliquely truncated in *leptosceles* and arum flower-shaped in *frustraminis*.

The female genitalia differ from those of the other two species of which the female is known (*mercennaria* and *direpta*) in that the dorsal margin of the ostium is shallowly concave (V-shaped in *mercennaria*; straight in *direpta*), the sides of the sterigma are not explanate as in *mercennaria*, the ostium is broader than in *direpta* and the eighth tergite extends caudally beyond the eighth sternite (it does not reach the tip of the sterigma in *direpta*).

Diataga frustraminis sp. n.

(Figs 61, 115, 122)

[*Diataga leptosceles* Walsingham, 1914: 375, partim – 1 ♂ only. Misidentification.]

ADULT (Fig. 61). ♂, 21 mm. Coloration and external structure similar to *leptosceles* but head and palpi not so heavily marked with brown, ground-colour chalky white rather than cream; thorax and tegula chalky white, only very slightly flecked with pale brown; legs paler and not as heavily marked with brown as in *leptosceles*; forewing costa with scattered pale scales but lacking pair of elongately rectangular cream spots present in *leptosceles*.

GENITALIA ♂ (Figs 115, 122). Saccus elongate and broad, 1·3 × as long as broad; uncus lobes elongate but only 0·25 length of genital armature, moderately sclerotized, setose. Subscaphium ribbon-like, broadened anteriorly. Juxta similar to that of *leptosceles*, apex of lobes distinctly membranous and ballooned; transtilla only weakly sclerotized, collar-shaped, inconspicuous, closely associated with spinose lobes at bases of valvae. Valva with strongly hooked ventral margin, separated from dorsal region bearing three triangular processes by deep emargination. Aedeagus with dorsal arm spatulate, strongly curved ventrad at apex; ventral arm (the aedeagus proper) characteristically arum flower-shaped; base of vesica with small, sclerotized plate.

GENITALIA ♀. Unknown.

DISTRIBUTION. French Guiana; Brazil.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 3 ex.
Holotype ♂, **French Giuana**: Rio Maroni, St Laurent, xi.1906 (*Le Moult*) (genitalia slide no. 12411; BMNH) (paralectotype of *leptosceles*).
Paratypes. **Brazil**: 1 ♂, Teffe, xii.1919 (*Parish*) (genitalia slide no. 12415; BMNH); 1 ♂, Lower Amazon, W. end of Parana de Buyassu, 15.i.1896 (*Austen*) (genitalia slide no. 12414; BMNH).

REMARKS. For separation of this species from the superficially similar *leptosceles*, see above and under 'Remarks' for *leptosceles*.

Diataga brasiliensis (Zagulajev) **comb. n.**

(Figs 62, 116, 123)

Morophaga brasiliensis Zagulajev, 1966: 642. Holotype ♂, BRAZIL (MINGA) [examined].

ADULT (Fig. 62). ♂, 21 mm. Vertex and frons buff-cream. Labial palpus cream flecked with dark brown, third segment appearing very short as base surrounded by elongate scales of second segment. Maxillary palpus cream with dark brown spot above on second and third segments. Antennal scape and pedicel cream, flecked with brown above; flagellum cream; cilia 4 × flagellar diameter. Thorax and tegula cream flecked with brown. Forewing cream marked with orange-brown along veins and speckled with dark brown; however, speckling almost absent anterior to R_3, thus forming a paler costal fascia occupying anterior third of wing; dark quadrate costal spot at nearly two-thirds, smaller deep brown spots at apex of R_1 and at apex of wing between R_2 and R_3, and between R_4, R_5 and M_1. Hindwing brownish cream with distinct golden tint, darker towards margin, with grey apical and subapical (costal) spots. Legs all missing except for foreleg (on slide) and hind tibia (glued); hind tibia cream, flecked below with dark brown, apices of both proximal spurs and underside of larger (inner) spur dark brown; outer proximal hind tibial spur 0·35 length of inner spur.

GENITALIA ♂ (Zagulajev, 1966: fig. 5; Figs 116, 123). Saccus elongate, twice as long as broad; uncus lobes short but infolded ventrad and extended anteriorly, 0·25 length of genital armature, quite strongly sclerotized, setose only posteriorly, anteriorly wrinkled and more strongly sclerotized. Subscaphium short, broad, inverted T-shaped. Juxta with collar-shaped base, forming pair of triangular lateral lobes; transtilla collar-shaped, closely associated with triangular setose lobes at bases of valvae. Valva almost triangular, ventral margin inturned and with shallow medial and subterminal triangular processes; middle of valva with strong fold extending to apex where it terminates in a triangular process; swelling of apical process extended as a shallow ridge to process at middle of ventral margin. Aedeagus dorsal arm 0·65 length of ventral arm (aedeagus proper), tapered from two-thirds to apex; apex of aedeagus with shallow thorn-like carinae; base of aedeagus with strong caudally-directed lobe.

GENITALIA ♀. Unknown.

DISTRIBUTION. Brazil.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.
Holotype ♂, **Brazil**: Rio Grande do Sul (genitalia slide [GSR]; MINGA).

REMARKS. In the original description of this species, Zagulajev (1966) gives a date of capture ('5.vii.') for the holotype. There is no date given on the data labels and the source of his information is unknown. The genitalia of the holotype were dissected and stored in glycerine in a vial by Zagulajev; I have mounted the genitalia in Euparal on a slide.

The external appearance of *brasiliensis* is distinctive; the hindwing is paler than that of *leptosceles*, *frustraminis* or *direpta*, more yellowish than that of *mercennaria*, and resembles that of *compsacma* or *levidensis* but is distinctively gold-tinted. The forewing pattern is paler than that of *leptosceles* or *frustraminis* and posteriorly as dark as *direpta* or *mercennaria*; however, the anterior third of the wing is pale. This division of the forewing into contrasting anterior and posterior fasciae is unknown in any other scardiine. The genitalia of *brasiliensis* differ from those of all other *Diataga* in the form of the aedeagus, with its short dorsal arm, and the characteristic pattern of ridging and processes on the valva.

Diataga compsacma Meyrick

(Figs 63, 117, 124)

Diataga compsacma Meyrick, 1919: 270. Lectotype ♂, GUYANA (BMNH), designated by Clarke, 1970: 47 [examined].

ADULT (Clarke, 1970: pl. 23, fig. 1; Fig. 63). ♂, 15, 16 mm. Vertex and frons cream. Labial palpus cream, flecked with dark brown on outer and upper surfaces. Maxillary palpus cream flecked with brown above on second segment. Antennal scape and pedicel cream with a few brown scales; flagellum very pale buff; cilia 4 × flagellar diameter. Thorax and tegula cream flecked with brown. Forewing cream marked with orange-brown along veins and speckled with dark brown; dark speckling concentrated in ill-defined wedge-shaped costal spot at one-half, otherwise sparse; pair of apical dark brown spots between R_4 and R_5 and R_5 and M_1 edged inwardly by pair of cream transverse lines. Hindwing off-white, flecked apically with brown. Legs cream flecked with brown, foreleg and mid-leg more densely flecked, particularly above; outer mid-tibial spur 0·3 length of inner; outer proximal hind tibial spur about 0·35 length of inner spur (damaged).

GENITALIA ♂ (Clarke, 1970: pl. 23, figs 1a, 1b; Figs 117, 124). Saccus elongate, about twice as long as broad (but angled in preparation); uncus lobes elongate, broadened apically, 0·25 length of genital armature, moderately sclerotized, setose. Subscaphium strongly sclerotized, broadened into inverted Y-shape anteriorly. Juxta details not visible in preparation; transtilla, if present, very weakly sclerotized and occluded in preparation by slightly sclerotized and strongly setose lobes at bases of valvae. Valva with ventral margin turned inward and extended into a triangular spine at one-half; beyond this, a nodular, setose excrescence bearing a smaller dorsal spine; with wedge-shaped subapical process. Aedeagus with dorsal arm swollen distally, curved ventrad and bifurcate at apex, as long as ventral arm (aedeagus proper).

GENITALIA ♀. Unknown.

DISTRIBUTION. Guyana.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 2 ex.
Lectotype ♂, **Guyana**: Bartica, xii.1912 (*Parish*) (genitalia slide no. JFGC 6651; BMNH).
Guyana: 1 ♂ (paralectotype), data as lectotype but i.1913.

REMARKS. This species is of similar coloration to *levidensis* and *mercennaria* although the latter has a more strongly developed forewing pattern with elements similar to those of *direpta* weakly expressed. *D. compsacma* is smaller than *mercennaria* although this difference may not be significant when further material is discovered (see, for example, the size-range of *leptosceles*). The wing-pattern of *compsacma* is more brownish than that of *levidensis* and the brown markings on legs and mouthparts are heavier. The male genital armature of *compsacma* is, like that of *levidensis*, very small, only about 1·2 mm long. By contrast, the genital armature is more than 1·8 mm long in *mercennaria* and longer in the other species. The male genitalia of *mercennaria* are quite distinctive – see 'Remarks' for that species. The genital differences between *compsacma* and *levidensis* are in the valvae and aedeagus. In *compsacma* the valva bears a medial triangular process arising close to the ventral margin with, beyond it, a nodular setose excrescence; in *levidensis* the medial triangular process is very shallow and beyond it arises an elongate process with a chisel-shaped end. The dorsal arm (process) of the aedeagus is bifid in *compsacma* but only channelled longitudinally at the apex in *levidensis*.

Diataga levidensis **sp. n.**

(Figs 64, 118, 125)

ADULT (Fig. 64). ♂, 16 mm. Coloration similar to *compsacma*, but brown speckling of labial palpus and legs very light; second segment of maxillary palpus dark brown above; flagellum white; cilia 3 × flagellar diameter. Forewing flecked with whitish scales, these concentrated at costa to form broken pale costal streak from one-third. Hindwing off-white, flecked with brown apically and with dark brown apical spot. Outer mid-tibial spur 0·35 length of inner; outer proximal hind tibial spur 0·25 length of inner spur.

GENITALIA ♂ (Figs 118, 125). Saccus triangular, almost twice as long as broad; uncus lobes elongate, broadened apically, 0·35 length of genital armature, moderately sclerotized, setose. Subscaphium strongly sclerotized, elongate, inverted T-shaped. Juxta with only weakly sclerotized collar-shaped base, forming pair of ovate lateral lobes; transtilla collar-shaped, closely associated with setose/spinose lobes at bases of valvae. Valva with shallowly inturned ventral margin forming shallow triangular process at one-third; from near middle of valva an elongate digitate process with chisel-shaped apex bearing four or five stiff bristles on internal bevel of 'chisel'. Aedeagus dorsal arm almost as long as ventral arm (aedeagus proper), explanate at apex, surface nearest ventral arm finely scobinate; base of aedeagus with small, round membranous areas appearing as perforations.

GENITALIA ♀. Unknown.

DISTRIBUTION. Peru.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ex.

Holotype ♂, **Peru**: Iquitos, iii.1920 (*Parish*) (genitalia slide no. 12416; BMNH).

REMARKS. This small, pale species resembles superficially *compsacma* and is of similar size. The wing-pattern resembles also that of *mercennaria* (which is more variegated) but *mercennaria* is a larger species (about 20 mm wingspan as opposed to 16 mm in *levidensis*); however, this difference may not be significant when longer series of both species are available. The forewings of *compsacma* are more brownish and the mouthparts and legs more heavily flecked with brown than in *levidensis*. The male genitalia of *levidensis* are characterized by the valva bearing a single, elongate process with chisel-shaped apex and by the short dorsal arm of the aedeagus: only *brasiliensis* and *levidensis* have the dorsal arm shorter than the ventral arm (aedeagus proper). In *levidensis* the ventral swelling at the base of the aedeagus is particularly pronounced.

Diataga mercennaria sp. n.

(Figs 65, 119, 120, 126, 170)

ADULT (Fig. 65). ♂♀, 19–21 mm. Coloration of head and appendages, thorax and tegulae similar to *compsacma* but flagellum scales off-white tipped with brown in holotype (off-white in paratypes); cilia 3 × (♂) or 0·4 × (♀) flagellar diameter. Forewing cream, finely speckled with brown; speckles concentrated to form inwardly oblique dark fascia from two-thirds of costa; dark brown pair of apical spots between R_4 and R_5 and R_5 and M_1 edged inwardly with pair of fine white transverse lines. Hindwing light grey-brown with paler speckles towards apex; dark apical spot; some diffuse, smaller, dark terminal spots between veins. Legs cream speckled with dark brown, speckles concentrated at bases of tarsi, on upper surface of foreleg (solid brown on tibia) and to form pair of ill-defined diagonal streaks on outer surface of mid-tibia; outer mid-tibial spur 0·4 length of inner; outer proximal hind tibial spur 0·35 length of inner spur.

GENITALIA ♂ (Figs 119, 120, 126). Posterior margin of eighth sternite with short digitate process either side of mid-line. Saccus square, anterior margin concave, 1·5 × as long as broad; uncus lobes short, 0·25 length of genital armature, fairly strongly sclerotized, setose, with strong laterobasal spine. Subscaphium not developed. Juxta narrow and ill-defined medially, forming pair of contorted, strongly sclerotized lobes; transtilla strongly sclerotized, forming pair of flattened rods overlying and closely associated with setose/spinose lobes at bases of valvae. Valva with strongly folded ventral margin forming sclerotized lobe; small triangular process from folded surface at one-half. Aedeagus with dorsal arm slightly longer than ventral arm, apex slightly swollen and rounded; ventral arm (aedeagus proper) with membranous dorsal surface, apex with pair of shallow, sclerotized, dorsally-directed processes each bearing an internal wart; base of vesica (? or end of ductus ejaculatorius) with pair of sclerotized plates.

GENITALIA ♀ (Fig. 170). Eighth tergite elongate, with pair of subapical groups each comprising 3 large and 3 or 4 small setae; eighth sternite forming strongly developed sterigma with explanate sides; ostium apical, flanked either side by 6 or 7 strong setae and a few smaller setae, dorsal margin with V-shaped medial emargination. Antrum twice length of eighth sternite, dorsal wall folded into pair of shallow lobes at one-half at inception of ductus seminalis. Ductus bursae broadening gradually into corpus bursae that extends to 1·25 length of apophyses anteriores; ductus and corpus bursae strongly wrinkled (?unexpanded – virgin specimen); signa absent.

DISTRIBUTION. Trinidad; French Guiana.

BIOLOGY. Unknown.

Material examined. 3 ex.
Holotype ♂, **French Guiana**: St Jean du Maroni, vii (*Le Moult*) (genitalia slide no. 12407; BMNH).
Paratypes. **French Guiana**: 1 ♂, Godebert-Maroni, v (*Le Moult*) (BMNH). **Trinidad**: 1 ♀, Caparo (*Birch*) (genitalia slide no. 12410; BMNH).

Remarks. This is a large, pale species with some of the wing-pattern elements of the much darker *direpta*. While *mercennaria* is larger than known specimens of *compsacma* or *levidensis*, this size difference may not be significant when longer series are available for comparison. The male genitalia of *mercennaria* are quite distinct from those of other *Diataga*: the eighth sternite bears caudal processes, the saccus is truncated anteriorly with a slightly concave anterior margin, the uncus has a pair of laterobasal spines, the transtilla forms a pair of rods, the juxta lobes are contorted and the subscaphium is not developed. The female genitalia are distinctive in that the sterigma is laterally explanate, strongly setose to either side of the ostium, and the dorsal margin of the ostium is strongly emarginate.

Diataga direpta sp. n.

(Figs 66, 171)

Adult (Fig. 66). ♀, 20, 23 mm. Coloration of head and appendages, thorax and tegulae similar to *compsacma* but head tufts with some brown scales admixed; flagellum scales off-white, some tipped with brown; cilia 0·3 × flagellar diameter. Forewing predominantly light brown, speckled with darker brown to form ill-defined oblique basal and postmedial fasciae; some whitish scales forming medial and subterminal blotches on costa, subterminal blotch broadly U-shaped. Hindwing light grey-brown with a few paler flecks at apex. Legs cream flecked with brown; foreleg more heavily flecked above, mid-tibia with pair of ill-defined oblique brown streaks on outer surface; outer mid-tibial spur 0·3 length of inner; outer proximal hind tibial spur 0·35 length of inner spur.

Genitalia ♂. Unknown.

Genitalia ♀ (Fig. 171). Eighth tergite shorter than eighth sternite, with about 20 pairs of strong setae scattered along full length of tergite close to lateral margins; eighth sternite forming strongly developed sterigma bearing scattered setae of moderate size over posterior half; ostium apical, narrow, dorsal margin transverse, straight. Antrum twice length of eighth sternite, with slight longitudinal fold (?artefact), inception of ductus seminalis at two-thirds posteriorly. Ductus bursae broadening gradually into ovoid, thin-walled corpus bursae; signa absent.

Distribution. Argentina.

Biology. Unknown.

Material examined. 2 ex.
Holotype ♀, **Argentina**: Alta Gracia, ii.1934 (*C.B.*) (genitalia slide no. 12408; BMNH).
Paratype. 1 ♀, same data as holotype (BMNH).

Remarks. This species resembles superficially *Morophaga choragella* (*q.v.*), so much so that Meyrick had identified the two specimens above as 'Scardia boleti' in his collection. While the wing-pattern of *direpta* is far more variegated than that of either *leptosceles* or *frustraminis*, it is nevertheless a large, dark species and more likely to be confused with one of these than with one of the smaller, paler species (*brasiliensis*, *compsacma*, *levidensis*, *mercennaria*). The female genitalia differ from those of *mercennaria* and *leptosceles* in that the sterigma is strongly setose in the posterior half, is not laterally explanate, and the ostial diameter is only about 0·06 mm (about 0·1 mm in *leptosceles*, 0·15 mm in *mercennaria*).

MOROPHAGA Herrich-Schäffer

Morophaga Herrich-Schäffer, 1853: (7), (22). Type-species: *Euplocamus morellus* Duponchel, 1838: 79, pl. 288, fig. 5, by subsequent monotypy (Herrich-Schäffer, 1854: 78).
Atabyria Snellen, 1884: 164. Type-species: *Atabyria bucephala* Snellen, 1884: 166, pl. 9, fig. 1, by monotypy. [Synonymized by Petersen (1959: 577).]
Osphretica Meyrick, 1910: 475. Type-species: *Osphretica chomatias* Meyrick, 1910: 475, by monotypy. [Synonymized by Gozmány (1966: 499).]
Microscardia Amsel, 1952: 139. Type-species: *Noctua boleti* F., 1777: 282, by original designation and monotypy. [Synonymized by Petersen (1959: 577).]

Diagnosis. Antenna (male) lacking dorsal cilia, ventral surface without scales; cilia longer than 1·5 ×

flagellar diameter. Scape with more than 15 pecten bristles. Interocular index (male) 1·0 or less. Maxillary palpus 5-segmented; pilifers present; second segment of labial palpus shorter than width of head. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs, but less in *borneensis*. Forewing with R_3 and R_4 stalked or approximated at base; M_2, M_3 and CuA_1 separate; coloration usually mottled, forming cryptic, coarse 'moss' pattern, but conspicuously different – bold purple-brown markings on white – in *bucephala*-group. Male with or without coremata in eighth abdominal segment; coremata associated with elongate, rod-like apodemes at anterior corners of eighth sternite in *choragella*-group (but not in *fasciculata*). Male genitalia with simple uncus – a pair of setose lobes – separated from tegumen by narrow band of membrane; tegumen completely sclerotized dorsally or broken by a membranous suture line; valva with setose basal lobe on inner surface; apex of valva forming ventral hook or hooks, or with spines; valvae separate, not fused together ventrally, with deep emargination forming longitudinal cleft; cleft not present, however, in *bucephala*-group; saccus longer than wide; juxta simple (but complex in *clonodes*), entire, not divided medially; vesica with or without spicular cornuti; aedeagus with or without carinae.

Conspicuous autapomorphies. None; may be recognized, however, by combination of 'moss'-patterned forewing with R_3 and R_4 stalked (but note aberrant pattern of *bucephala*-group) and deeply cleft valva (not in *bucephala*-group).

Distribution. Western and eastern Palaearctic region; Afrotropical region; Oriental region; Australian region. Absent from the New World.

Biology. See under entries for individual species.

Remarks. Preliminary work on the Scardiinae in 1975 suggested that the type-species of *Scardia* was *Tinea mediella* Hübner, 1796, a result of the designation by Walsingham (November, 1914) of 'Noctua boleti F.' as type-species. *Noctua boleti* F., 1777, is not eligible for designation as type-species of *Scardia* Treitschke as it is not an included species. However, Walsingham included *Tinea mediella* Hübner, 1796, in his synonymy of *boleti* and, as *mediella* is one of the species included by Treitschke, its designation as type-species by Walsingham would have been valid (*Int. Code zool. Nom.*, Article 69(a) (v)) had it been the earliest designation. *Tinea mediella* Hübner, 1796, is currently considered to be a junior subjective synonym of *Tinea choragella* [Denis & Schiffermüller], 1775: 137 (Charpentier, 1821: 127).

This finding, which would have made *Scardia* the valid generic name for the species placed here in *Morophaga*, and *Fernaldia* the valid name for those in *Scardia*, was communicated to several workers *in litteris*. Generic combinations and synonymy based on the Walsingham designation were published by Davis (1983). My colleagues I. W. B. Nye and D. S. Fletcher have recently found an earlier designation of a type-species for *Scardia* by Busck (April, 1914). This designation (see below) maintains the usage of *Morophaga* and *Scardia* by authors with the exception of Davis (1983).

Morophaga could well be paraphyletic with respect to *Diataga* and *Amorophaga* – see the discussion following numerical analysis.

The *bucephala*-group

Diagnosis. Outer and mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing pattern conspicuous, bold purple-brown markings on a white ground-colour. Male with coremata in eighth abdominal segment; coremata without associated apodemes. Tegumen unbroken, completely sclerotized dorsally; valva without longitudinal cleft; juxta simple, entire, not divided medially; vesica lacking spicular cornuti; aedeagus with spicular or spinose carinae.

Conspicuous autapomorphies. Wing pattern of bold purple-brown blotches on a white or off-white background; valva with ventral margin extended caudally so that valva is rudder-shaped.

Distribution. Eastern Palaearctic region; Oriental region as far east as New Guinea; Afrotropical region. Absent from the western Palaearctic region and Australia.

Key to species of the *bucephala*-group

1 Distal margin of large spot on posterior margin of forewing angled towards apex of wing (Fig. 67); angle between extended ventral margin and dorsal region of valva with triangular process (Fig. 127); antrum less than one-half length of apophyses anteriores (Fig. 173) **cremnarcha** (p. 122)
– Distal margin of large spot on posterior margin of forewing angled towards middle of costa; angle between extended ventral margin and dorsal region of valva without triangular process; antrum at least four-fifths length of apophyses anteriores 2

2 Inner surface of labial palpus cream; maxillary palpus cream with a few darker scales on second and third segments; upper surface of hindleg ochreous, like under-surface; dorsal region of valva rounded apically (Fig. 128); antrum + ductus bursae as long as apophyses anteriores, corpus bursae only slightly offset to the left (Fig. 174) .... ***bucephala***(p. 123)

– Inner surface of labial palpus brown; maxillary palpus brown; upper surface of hindleg grey, paler at articuatlions; dorsal region of valva truncated apically; antrum + ductus bursae considerably longer than apophyses anteriores, ductus strongly looped to the left (Figs 175, 176) 3

3 Distal margin of large spot on posterior margin of forewing slightly concave or sinuate (Fig. 69); caudal extension of ventral region of valva rounded in cross-section, with subapical process (Fig. 129); microtrichia in antrum larger anteriorly than posteriorly .... ***soror***(p. 124)

– Distal margin of purple-brown spot on posterior margin of forewing strongly 'stepped' (Fig. 70); caudal extension of ventral region of valva flattened, truncated at apex, without subapical process (Fig. 130); microtrichia in antrum of uniform size .... ***vadonella***(p. 124)

Morophaga cremnarcha (Meyrick) **comb. n.**

(Figs 67, 127, 173)

Scardia cremnarcha Meyrick, 1932*b*: 323. LECTOTYPE ♂, KASHMIR (BMNH), here designated [examined].

Morophaga nigrocapitella Petersen, 1959: 571, pl. 32, fig. 1; fig. 19. Holotype ♂, AFGHANISTAN [SW.]: Arghandab R. (LN) [not examined]. **Syn. n.**

ADULT (Petersen, 1959: pl. 32, fig. 1; Fig. 67). ♂, 12–25 mm. ♀, 18–26 mm. Coloration and external structure similar to *bucephala* but ♂ antennal cilia 4 × flagellar diameter. Distal margin of large spot on posterior margin of forewing angled towards apex.

GENITALIA ♂ (Petersen, 1959: fig. 19; Zagulajev, 1973: fig. 62; Fig. 127). Similar to *bucephala* but valva with triangular process present in angle between caudal extension of ventral region of valva and dorsal region; bilobate process close to costa with distal lobe enlarged and tapered; aedeagus not as slender as in *bucephala*, only 15 × as long as broad, apical one-sixth with about six minute thorn-like carinae.

GENITALIA ♀ (Fig. 173). Similar to *bucephala*, but medial emargination of eighth sternite broader, V-shaped. Antrum short, half length of apophyses anteriores, not as thick-walled as in *bucephala*, inner surface evenly lined with fine microtrichia anteriorly from inception of ductus seminalis. Ductus bursae with four or five regular transverse constrictions, only slightly offset to the left. Corpus bursae with posterior diagonal ribbing.

DISTRIBUTION. Afghanistan; Kashmir; India (Uttar Pradesh, Himachal Pradesh, Bihar, Madras); Nepal.

BIOLOGY. Three of Meyrick's syntypes were found on 'old tree-stumps on which *Polyporus* was growing, but I could find no trace of larvae, pupae or cocoons in the fungus' (Fletcher – quoted by Meyrick, 1932*b*: 323). The specimen from the Shevaroy Hills referred to as '*Atabyria bucephala*' by Fletcher ([1921]: 189) was bred 'from cocoons about a fungus growth on a tree'. Fletcher (1933: 73), referring to this species as '*Scardia bucephala*', records adults (presumably the syntypes of *cremnarcha*) resting on rotten tree-stumps at Gulmarg, Kashmir.

MATERIAL EXAMINED. 12 ex.

Lectotype ♂, **Kashmir**: Gulmarg, 8800′, vii.1931 (*Fletcher*) (BMNH).

Kashmir: 1 ♂, 2 ♀ (paralectotypes), data as lectotype (BMNH). **India**: 1 ♀, Uttar Pradesh, Mukteswar, 19.vii.1927; 1 ♀, Himachal Pradesh, Dharmsala, 1879 (*Hocking*); 1 ♂, Himachal Pradesh, Kangra Valley, 4500′, ix.1899 (*Dudgeon*); 2 ♂, Bihar, Pusa, 12.viii.1909 & 30.vi.1919 (*H. L. D.*, *Fletcher*); 1 ♀ with pupa, Madras, Shevaroy Hills, Yercaud, from cocoons about a fungus growth on a tree, 21.iv.–4.v.1913 (*Y. R.*). **Nepal**: 1 ♀, Kathmandu District, Godaveri, 1700m, vii.1982 (*Allen*). (All in BMNH.)

REMARKS. The four species of the *bucephala*-group (*bucephala*, *soror*, *vadonella* and *cremnarcha*) are allopatric but restricted to the Old World; however, there may well be overlap of the ranges of *cremnarcha* and *bucephala* in NE. India and possibly Nepal. The wing patterns of three species are almost identical but that of *cremnarcha* is different, the large purple-brown spot on the posterior margin of the forewing being extended towards the wing-apex. The valva of *cremnarcha* bears a characteristic triangular flap between the dorsal lobe and the caudal extension, and the aedeagus is somewhat stouter (length = 15 × width, as opposed to 20–25 × in the other species); in the female the antrum is only half the length of the apophyses anteriores as opposed to roughly the same length in the other species. The wing-patterns of *bucephala*, *soror* and *vadonella* are similar, but the distal margin of the large spot on the posterior margin of the forewing is 'stepped' in *vadonella* (more so in the two females examined than in the rather worn male holotype) and in examples of *bucephala* from New Guinea; *bucephala* from elsewhere, and *soror*, have the margin slightly concave or sinuate. Both *vadonella* and *soror* differ from *bucephala* in having the whole of the labial palpus and the maxillary palpus brown – in *bucephala* the inner surface of the labial palpus is cream, as is the maxillary palpus except for some darker scaling on the second and third segments. In *bucephala* the dorsal region of the valva is rounded distally but it is truncated in *soror* and *vadonella*: microtrichia are restricted to the anterior one-quarter of the antrum in *bucephala* but evenly scattered in the other two species. The major difference between *soror* and *vadonella* lies in the form of the valva: the caudal extension of the ventral margin is rounded in cross-section in *soror* and bears a short subapical process. This process is absent in *vadonella* and the caudal extension of the valva is flattened and truncated. Differences in the female genitalia are minimal – the eighth sternite of *soror* is marginally narrower than that of *vadonella* and the microtrichia in the antrum are larger anteriorly whereas in *vadonella* they are of uniform size. The bursa copulatrix is not as elongate in *vadonella* as in *soror* (but still longer than in *bucephala*).

A tentative phylogenetic sequence for the group would have *soror* and *vadonella* as sister-groups (synapomorphies: colour of palpi, truncation of dorsal region of valva, strongly looped and elongate ductus bursae), *bucephala* as their sister-group (synapomorphies: forewing pattern, very slender aedeagus), and *cremnarcha* as the sister-group of the other three.

Morophaga bucephala (Snellen)

(Figs 68, 128, 174)

Atabyria bucephala Snellen, 1884: 166, pl. 9, fig. 1. LECTOTYPE ♂, U.S.S.R. (ZI), here designated [examined].

Osphretica chomatias Meyrick, 1910: 475. Holotype ♂, SARAWAK (BMNH) [examined]. [Synonymized by Bradley, 1965: 116.]

Depressaria rotundata Matsumura, 1931: 1091. Lectotype ♀, JAPAN (EIHU), designated by Ridout, 1981: 36 [not examined]. [Synonymized by Bradley, 1965: 116.]

ADULT (Snellen, 1884: pl. 9, fig. 1a (colour); Issiki, 1957: fig. 49 (colour); Zagulajev, 1973: pl. 2, fig. 5 (colour); Fig. 68). ♂♀, 11–23 mm. Vertex and frons purple-brown, paler towards mouth. Labial palpus brown on outer surface, cream on inner surface. Maxillary palpus cream, some darker scaling on second and third segments. Antennal scape and pedicel dark brown; flagellum ochreous, some darker scales dorsally; cilia 3 × (♂) or 0·3 × (♀) flagellar diameter. Thorax and tegula purple-brown anteriorly, cream posteriorly. Forewing cream with a brownish tint, patterned with bold purple-brown spots; distal margin of large posterior spot weakly concave or sinuate (but strongly stepped in examples from New Guinea and in one of two specimens known from Assam). Hindwing grey. Legs ochreous cream; foreleg and mid-leg dark brown above but pale at articulations; outer mid-tibial spur 0·4 length of inner; outer proximal hind tibial spur 0·5 length of inner.

GENITALIA ♂ (Petersen, 1959: fig. 20; Zagulajev, 1973: fig. 59; Fig. 128). Saccus elongate, as long as tegumen + uncus; uncus lobes short, infolded ventrad, hardly sclerotized, setose. Subscaphium elongate, ribbon-like. Juxta weakly developed, shield-shaped; transtilla inverted U-shaped, closely associated with setose lobes at bases of valvae. Valva with rounded ventral apex, with m-shaped bilobate process close to costa. Aedeagus slender, 25 × as long as wide, apical fifth with about 15 minute, thorn-like carinae; vesica without cornuti.

GENITALIA ♀ (Petersen, 1959: fig. 21; Zagulajev, 1973: figs 60, 61; Fig. 174). Eighth tergite slightly longer than eighth sternite, with subapical row of about 8 strong setae and apical line of numerous smaller setae; eighth sternite only weakly sclerotized, m-shaped, posterior margin forming ventral lip of ostium. Antrum tapered anteriorly, then slightly swollen posterior to inception of ductus seminalis at level of anterior margin of eighth sternite; anterior to inception of ductus seminalis only weakly sclerotized, but thick-walled, almost reaching apices of apophyses anteriores; with fine microtrichia on inner surface of anterior one-quarter (and also medially in a specimen from New Guinea). Ductus bursae very short, weakly turned to the left. Corpus bursae thin-walled, ovoid; signa absent.

DISTRIBUTION. U.S.S.R. (Amur, Chabarovsk, Primorsk – Zagulajev, 1973); China (Kwangtung – Meyrick, 1934; Kiangsu – Meyrick, 1935; Yunnan – Meyrick, 1938); Japan; Korea; India (Assam); Burma; Malaya; Borneo; Sulawesi; New Guinea.

Biology. See Zagulajev (1973: 81) for an account of the habitat and dates of appearance of this species which does not appear to have been reared.

Material examined. 69 ex.

Lectotype ♂ (of *Atabyria bucephala*), **U.S.S.R.**: Primorsk, Chabarovsk, Suifun, 14.viii.1887 (ZI). Holotype ♂ (of *Osphretica chomatias*), **Sarawak**: Kuching, x.1907 (*Hewitt*) (BMNH).

67 ex., various localities (see 'Distribution') (BMNH, ZI).

Remarks. See 'Remarks' for *cremnarcha*, above. The distribution of *bucephala* is surprisingly broad. However, only females are known from New Guinea and their conspecificity with material from the eastern U.S.S.R. is uncertain.

Morophaga soror Gozmány

(Figs 69, 129, 176)

Morophaga soror Gozmány, 1965: 281, fig. 33. Holotype ♂, Congo (HNHM) [not examined].

Adult (Fig. 69). ♂♀, 14–23 mm. Coloration and external structure similar to *bucephala* but labial palpus brown on inner surface; maxillary palpus brown; antennal cilia (♂) 2·0–2·5 × flagellar diameter; upper surface of hindlegs greyish, paler at articulations. Forewing with distal margin of large posterior spot usually slightly concave.

Genitalia ♂ (Gozmány, 1965: fig. 33; Gozmány & Vári, 1973: fig. 449; Fig. 129). Similar to *bucephala* but valva with dorsal region markedly truncated; caudal extension of ventral region thus proportionately longer, with blunt dorsally-directed subapical process; aedeagus slender, about 20 × as long as broad, apical one-quarter with about 8 minute thorn-like carinae (carinae more numerous – about 30 – in a specimen from Uganda, Ruwenzori).

Genitalia ♀ (Gozmány & Vári, 1973: fig. 450; Fig. 176). Similar to *bucephala* but strong setae mixed with smaller setae at posterior margin of eighth tergite. Antrum with inner surface evenly lined with microtrichia anteriorly from inception of ductus seminalis (but posterior microtrichia only one-third length of those in anterior region of antrum). Ductus bursae elongate, with regular transverse constrictions, and strongly looped to the left.

Distribution. Sierra Leone; Ivory Coast; Ghana; Cameroon; Fernando Poo (Equatorial Guinea); Uganda; Kenya. Reliable literature records also exist for Congo, Zaire and Zambia (Gozmány & Vári, 1973: 148).

Biology. Unknown.

Material examined. 33 ex., various localities (see 'Distribution') (BMNH).

Remarks. See 'Remarks' for *bucephala*, above.

Morophaga vadonella (Viette)

(Figs 70, 130, 175)

Sporadartha [sic] *vadonella* Viette, 1954: 78, fig. 4. Holotype ♂, Madagascar (MNHN) [examined].
Morophaga vadonella (Viette) Gozmány, 1969: 295.

Adult (Fig. 70). ♂, 15 mm. ♀, 17, 19 mm. Coloration and external structure similar to *bucephala* but labial palpus brown on inner surface; maxillary palpus brown; ♂ antennal cilia 2·5 × flagellar diameter; upper surface of hindleg greyish, paler at articulations. Distal margin of large spot on posterior margin of forewing 'stepped' or strongly concave.

Genitalia ♂ (Viette, 1954: fig. 4; Fig. 130). Similar to *bucephala* but dorsal region of valva markedly truncated apically; caudal extension of ventral region thus proportionately longer, square-ended, without blunt subapical process; aedeagus slender, about 25 × as long as broad, with only one ill-defined and minute subapical thorn-like carina.

Genitalia ♀ (Gozmány, 1969: fig. 11; Fig. 175). Similar to *bucephala* but differing in the same details as *soror*; eighth sternite slightly broader than in *soror*, bursa copulatrix not as elongate, microtrichia of antrum of even size.

Distribution. Madagascar.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 3 ex.

Holotype ♂, **Madagascar** [NE.]: Maroantsetra, x.1952 (*Vadon*) (MNHN).

Madagascar: 1 ♀, Betroka, 1955 (*Diehl*); 1 ♀, Ambinanindrano, 50 km W. of Mohanoro, i.1913 (*Kestell-Cornish*) (BMNH).

REMARKS. See 'Remarks' for *bucephala*, above.

The *morellus*-group

DIAGNOSIS. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with mottled coloration forming cryptic, coarse 'moss' pattern. Male with coremata in eighth abdominal segment; coremata not associated with apodemes. Tegumen unbroken, completely sclerotized dorsally; valva with deep emargination forming longitudinal cleft; juxta simple, entire, not divided medially; vesica lacking spicular cornuti; aedeagus smooth-surfaced, without spicular carinae.

CONSPICUOUS AUTAPOMORPHIES. See species' description.

DISTRIBUTION. Western Palaearctic region.

Morophaga morellus (Duponchel)

(Fig. 71)

Euplocamus morellus Duponchel, 1838: 79, pl. 288, fig. 5. Syntypes, 1 ♂, 1 ♀, [FRANCE] (?MNHN) [not examined].

Morophaga morella f. *fungicolella* Dumont, 1930: 286. Syntypes, 1 ♂, 3 ♀, TUNISIA (BMNH) [examined]. **Syn. n.**

ADULT (Duponchel, 1838: pl. 288, fig. 5 (colour); Zagulajev, 1973: pl. 1, fig. 1 (colour); Fig. 71). ♂♀, 21–28 mm. Vertex and frons greyish brown, scales tipped with white, pair of paler lateral tufts arising close to tentorial pits. Labial palpus greyish brown, scales tipped with white, but inner surface buff; third segment diffusedly banded with black basally and subapically. Maxillary palpus cream, dark scales above on second and third segments. Antennal scape and pedicel ochre-brown, with darker brown ventral scales; flagellum medium brown; cilia 2·5 × (♂) or 0·4 × (♀) flagellar diameter. Thorax and tegula dark brown anteriorly, light grey-brown posteriorly. Forewing ground-colour light brown, strongly speckled and mottled with dark brown, dark spots concentrated medially and subterminally. Hind wing light grey-brown with some ill-defined darker speckles towards apex. Legs buff but foreleg and mid-leg dark brown above, banded with buff at articulations; hind tibia light greyish above; outer mid-tibial spur 0·4 length of inner; outer proximal hind tibial spur 0·5 length of inner.

GENITALIA ♂ (Petersen, 1957: fig. 244; Zagulajev, 1968: fig. 7, 1973: fig. 48). Saccus broadly triangular but as long as tegumen + uncus; uncus lobes short, square-ended, infolded both mesad and ventrad, moderately sclerotized, setose. Subscaphium ill-defined, broadening posteriorly. Juxta large, shield-shaped and conspicuously wrinkled; transtilla not developed. Valva with emargination separating ventral lobe bearing three peg-like processes from smaller dorsal lobe bearing subapical ventral flap. Aedeagus stout, S-shaped, 5 × as long as wide, without carinae; vesica lacking cornuti.

GENITALIA ♀ (Petersen, 1957: fig. 245; Zagulajev, 1968: fig. 8, 1973: figs 49, 50). Eighth tergite as long as eighth sternite, with subapical row of about eight strong setae; eighth sternite strongly sclerotized, medially emarginate anteriorly, extended posteriorly into pair of digitate processes each bearing three strong setae and overlying ostium. Antrum cylindrical, 0·25 length of apophyses anteriores. Ductus bursae short, 0·5 length of antrum. Corpus bursae globular, only reaching two-thirds length of apophyses anteriores; signa absent.

DISTRIBUTION. S. France; Morocco; Tunisia; Sardinia; Sicily; Malta. Also reliably recorded in the literature from Spain, Algeria (Dumont, 1930); Asia Minor (Petersen, 1957); Italy, Greece (Rhodes) (Petersen & Gaedike, 1979); U.S.S.R. (Crimea, Caucasus) (Zagulajev, 1973).

BIOLOGY. This species has been bred from an excrescence on *Morus* (Duponchel, 1838), bred from *Xanthochisma plorans* on *Populus* and from fungus in hollow *Pistacia atlantica* (Dumont, 1930), bred from a polypore on *Quercus suber* (Martelli & Arru, [1959]) and bred from dead wood of *Quercus* (Staudinger, 1880: 270). The biology of this species has been discussed by Dumont (1930) who described the egg, larva and pupa.

Material examined. 25 ex.

Syntypes (of *Morophaga morella* f. *fungicolella* Dumont), 1 ♂, 3 ♀, **Tunisia**: Maknassy, bred from fungus in *Pistacia*, various dates 1929–30 (*Dumont*) (BMNH).

21 ex., various localities (see 'Distribution') (BMNH, ZI).

Remarks. The only scardiine with a circum-Mediterranean distribution, *morellus* may be recognized by its wing-pattern which is brownish, rather than olivaceous as in members of the *choragella*-group. The characteristic short, square-ended uncus lobes of the male serve to differentiate it from all other *Morophaga* species. Its habitat is probably rather different from that of most other Scardiinae; whereas most species inhabit moist forest and woodland, the distributional records of *morellus* suggest that it is an inhabitant of much drier environments with open sclerophyll forest.

The *sistrata*-group

Diagnosis. Outer mid and proximal hind tibial spurs <0·4 length of inner spurs. Forewing with mottled coloration forming cryptic, coarse 'moss' pattern. Male lacking coremata in eighth abdominal segment. However, coremata present (not associated with apodemes) in *borneensis*. Tegumen broken dorsally by at least a membranous suture line; valva with deep emargination forming longitudinal cleft; juxta simple, entire, not divided medially; vesica with spicular cornuti; aedeagus smooth-surfaced, without spicular carinae.

Conspicuous autapomorphies. Uncus lobes fused apically and forming a small hook; aedeagus and vesica elongate, vesica with line of strong cornuti (but not in *borneensis*).

Distribution. Oriental region.

Key to species of the *Morophaga sistrata*-group (females are known only of *sistrata*)

Males

1 Coremata present in eighth abdominal segment; aedeagus short, less than 1·0 mm long, lacking cornuti (Fig. 135) .... ***borneensis***(p. 126)

– Coremata absent from eighth abdominal segment; aedeagus elongate, more than 1·25 mm long, with many stout cornuti (Figs 136, 137) 2

2 Saccus elongate, 2·0–2·2 × as long as wide; apex of dorsal half of valva in the shape of a horse's head; ventral margin of ventral half of valva smooth (Fig. 132) .... ***sistrata***(p. 127)

– Saccus exceptionally elongate, 2·5 × or more as long as wide; apex of dorsal half of valva evenly rounded; ventral margin of ventral half of valva with strong pectinifer 3

3 Pectinifer on ventral margin of valva regular; strong hook-shaped process between pectinifer and base of valva (Fig. 133) .... ***formosana***(p. 128)

– Pectinifer on ventral margin of valva irregular; no process between pectinifer and base of valva (Fig. 134) .... ***iriomotensis***(p. 128)

Morophaga borneensis sp. n.

(Figs 72, 131, 135)

Adult (Fig. 72). ♂, 13 mm. Vertex and frons cream, darker scales near eyes. Labial palpus cream flecked with brown, pale on inner surface, at apex of second segment and on outer surface of third segment except for brownish basal and subapical spots. Maxillary palpus cream, dark brown above on second and third segments. Antennal scape cream; pedicel dark brown; flagellum ochreous, darker brown above on basal three segments; cilia 2·0–2·5 × (♂) flagellar diameter. Thorax and tegula brown, a little paler posteriorly. Forewing (very worn) cream, marked with orange-brown on veins and strongly mottled with dark brown. Hindwing light brownish grey. Legs ochreous cream; foreleg and mid-leg dark brown above but pale at articulations and in middle of tibiae. (Hindlegs missing.) Outer mid-tibial spur 0·3 length of inner spur.

Genitalia ♂ (Figs 131, 135). Small coremata present in eighth segment, without associated apodemes. Saccus only as long as tegumen + uncus; uncus lobes extending just beyond apices of valvae, fused caudally and slightly hooked at apex. Subscaphium strongly developed, broad, ribbon-like. Juxta shield-shaped, only weakly sclerotized; transtilla inverted U-shaped, closely associated with small, digitate setose lobes at bases of valvae. Valva cleft (emarginate) for half its length, dorsal lobe with inwardly-directed triangular flap at apex; ventral lobe with hooked apex, pair of small, triangular sclerotizations extending dorsad from ventral margin across membranous inner face. Aedeagus short and stout, 6 × as long as broad at mid-length, without carinae; vesica without cornuti.

Genitalia ♀. Unknown.

Distribution. Borneo.

Biology. Unknown.

Material examined. 1 ♂.
Holotype ♂, **Sabah**: Ulu Dusun, 30 miles W. of Sandakan, lowland dipterocarp forest, 28–31.i.1976 (*Classey*) (genitalia slide no. 13197; BMNH).

Remarks. This species is the smallest member of the *sistrata*-group. It may be separated from the three others also by the characteristic form of the valva, the presence of coremata, and the short, stubby aedeagus which lacks cornuti.

The *sistrata*-group is Oriental and the distributions of its four constituent species are allopatric. The female of only *sistrata* is known, so the diagnostic comments here are confined to males. Externally, all four species are remarkably similar although *borneensis* is very small (13 mm as opposed to 16–20 mm in the other species) and is matched in size only by a single dwarf (12 mm) example of *sistrata*. Rather smaller and darker than members of the *choragella*-group, members of the *sistrata*-group cannot be reliably separated externally. Males of two species possess pectinifers on the ventrodistal margin of the valva: the pectinifer is neat and regular in *formosana* but proximally irregular in *iriomotensis*. Of the other two species, *borneensis* possesses a pair of small coremata in the eighth segment but *sistrata* does not. Other differences are highlighted below. A phylogenetic arrangement of the species would have *formosana* and *iriomotensis* as sister-groups (synapomorphy: valval pectinifer), *sistrata* as the sister-group of this pair (synapomorphy: loss of coremata) and *borneensis* as the sister-group of the other three.

Morophaga sistrata (Meyrick) **comb. n.**

(Figs 73, 132, 136, 179)

Scardia sistrata Meyrick, 1916: 618. LECTOTYPE ♂, Sri Lanka (Ceylon) (BMNH), here designated [examined].

Adult (Fig. 73). ♂♀, (12 mm dwarf), normally 16–20 mm. Vertex and frons light brown, scales tipped with cream. Labial palpus cream flecked with brown, third segment with basal and subapical brown rings. Maxillary palpus whitish, flecked with brown on upper surface. Antennal scape cream, marked with brown above, pecten bristles light brown tipped with cream; pedicel brown; flagellum creamy brown; cilia 3 × (♂) or 0·5 × (♀) flagellar diameter. Thorax and tegula cream, densely flecked with brown anteriorly. Forewing cream, marked with orange-brown along veins and densely mottled with dark brown. Hindwing light brownish grey, some darker and lighter speckling at apex. Legs ochreous cream flecked with brown; foreleg and mid-leg brown above but pale at articulations, mid-tibia with pale band at one-half, hind tarsus brown basally; outer mid-tibial and outer proximal hind tibial spurs 0·3 length of inner spurs.

Genitalia ♂ (Figs 132, 136). Coremata absent. Saccus elongate, longer than tegumen + uncus; uncus lobes extending well beyond apices of valvae, fused caudally, forming slight apical hook, weakly sclerotized, setose. Subscaphium well-defined, ribbon-like. Juxta moderately sclerotized, U-shaped; transtilla inverted U-shaped, closely associated with small, digitate setose lobes at bases of valvae. Valva deeply cleft (emarginate), dorsal lobe with horse's head-shaped apex; ventral lobe with hooked apex and triangular basal lobe. Aedeagus slender, elongate, 12 × as long as wide at mid-length, lacking carinae; vesica with broken line of about 80 small, strong cornuti.

Genitalia ♀ (Fig. 179). Eighth tergite longer than eighth sternite, with 7 or 8 strong marginal setae towards apex and similar number of smaller setae; eighth sternite almost triangular, irregularly margined, with medial ostium flanked by pair of stout digitate processes, each with 3 strong apical setae and numerous smaller setae. Antrum twice length of eighth sternite, not extending beyond inception of ductus seminalis. Ductus bursae relatively thick-walled, contiguous with corpus bursae, with ventral scobinate band (not microtrichia). Corpus bursae thin-walled, extending to almost twice length of apophyses anteriores; signa absent (but pathological sclerotization of wall of ductus bursae present in one example examined).

Distribution. Sri Lanka; India; Thailand; Malaya; Sulawesi; Philippines.

Biology. Larvae have been found feeding in decayed *Polyporus* (Meyrick, 1916: 618) in Ceylon and have been reared at Dehra Dun, India, from a fungus (Fletcher, 1933). The biology of this species, found in *Fomes* sp. at Pusa, Bihar, India, is described in detail by Fletcher ([1921]: 186).

MATERIAL EXAMINED. 51 ex.

Lectotype ♂, **Sri Lanka** (Ceylon): Puttalam, x.1904 (*Pole*) (BMNH).

Sri Lanka (Ceylon): 1 ♂, 1 ♀, Puttalam, v., x.1904 (*Pole*); 3 ♀, Wellawaya, xi.1905 (*Alston*); 1 ♀, Peradeniya, vii.1905 (*Green*); 1 ♂, 1 ♀, 1904 (*Pole*) (paralectotypes; all BMNH); 18 ex., Colombo, Puttalam, Peradeniya, Nawalapitiya (BMNH). **India**: 2 ♂, 1 ♀, Bihar, Pusa, 20.vii.1907, 2.ix.1908, 6.xi.1908 (*Fletcher*) (paralectotypes; BMNH); 12 ex., Lucknow ('ex 1. in fungus'), Pusa, Karwar, N. Arcot – Sangarambadi ('from a fungus') (BMNH). **Thailand**: 2 ♂, without detailed locality (BMNH). **Malaya**: 1 ♂, Prov. Wellesley, 'a fungus on coconut stump', 22.vi.1920 (*Corbett*) (BMNH). **Sulawesi** (Celebes): 1 ♀, Sangihe I. ('Sanguir'), 1892 (*Doherty*) (BMNH); 2 ♂, Sulawesi Utara, Dumoga-Bone National Park, alluvial forest, ii.1985 (*Barlow*; *Holloway*) (BMNH). **Philippines**: 1 ♂, 1 ♀, Palawan, Brookes Point, Uring Uring, 22.viii., 27.ix.1961 (*Noona Dan Exp.*) (ZM); 1 ♂, Mindanao, Sapamoro, Curuan dist., 16.xii.1961 (*Noona Dan Exp.*) (ZM).

REMARKS. There are minor racial differences between the male genitalia of *sistrata* from Sri Lanka and examples from the Philippines. The horse's head-shaped dorsal apex of the divided valva is broader and slightly more inturned in Philippine specimens. The triangular flap-like process on the ventral margin of the valva is basal in Sri Lankan examples but somewhat larger and situated further distad, almost at one-half the length of the ventral margin of the valva, in specimens from the Philippines.

Joannis (1930: 742) has recorded this species from Vietnam (Hanoi): the record is unconfirmed but is not unlikely.

Morophaga formosana sp. n.

(Figs 74, 133, 137)

ADULT (Fig. 74). ♂, 18 mm; ♀, 16 mm. Vertex and frons cream, tufts close to tentorial pits basally dark. Labial palpus cream flecked with brown, brown scales concentrated at base and middle of third segment. Maxillary palpus cream flecked with brown, dark brown scales above on second segment. Antennal scape cream (worn); pedicel dark brown; flagellum light ochre; cilia 3 × (♂) or 0·5 × (♀) flagellar diameter. Thorax and tegula whitish, brown anteriorly. Forewing whitish (?faded) marked with orange-brown on veins and strongly mottled with dark brown. Hindwing light brownish grey. Legs cream flecked with brown. Foreleg and mid-leg strongly marked with blackish brown above but pale at articulations and in middle of tibia; outer mid-tibial and outer proximal hind tibial spurs 0·3 length of inner spurs.

GENITALIA ♂ (Figs 133, 137). Coremata absent. Saccus elongate, 1·2 × length of tegumen + uncus; uncus lobes slender, extending a little beyond apices of valvae, fused caudally, forming shallow and inconspicuous ventral hook, moderately sclerotized, setose. Subscaphium well-defined, ribbon-like. Juxta narrowly U-shaped, well-sclerotized; transtilla strongly developed, inverted U-shaped, closely associated with small, digitate setose lobes at bases of valvae. Valva cleft (emarginate) for one-third its length, costa with thorn-like process at three-quarters; ventral lobe with larger thorn-like process from ventral margin at one-half and with well-ordered apical pectinifer of about 14 spines. Aedeagus elongate, slender, 18 × as long as wide at mid-length, lacking carinae; vesica with broken line of about 80 small, strong cornuti.

GENITALIA ♀. Unknown.

DISTRIBUTION. China; Taiwan.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 3 ex.

Holotype ♂, **Taiwan**: Taihoku, vi.1935 (*Issiki*) (genitalia slide no. 13119; BMNH).

Paratype. **Taiwan**: 1 ♀, Tainan, 10.iv.1906 (*Wileman*) (abdomen missing) (BMNH).

Excluded from paratype series. **China**: 1 ♂, Fu-chou ('Foochow'), 1935–6 (*Yang*) (BMNH).

REMARKS. Males of this species differ from both *sistrata* and *borneensis* in possessing a conspicuous pectinifer at the apex of the ventral lobe of the valva; a pectinifer is also present in *iriomotensis* (see 'Remarks' for that species). Like *sistrata* (but unlike *borneensis*) the aedeagus is elongate, the vesica bears a row of about 80 small, strong cornuti and the eighth segment lacks coremata.

Morophaga iriomotensis sp. n.

(Fig. 134)

ADULT. ♂, 19 mm. Similarly patterned to *sistrata* and *formosana* (see above).

GENITALIA ♂ (Fig. 134). Coremata absent. Saccus narrow, 2·5 × as long as wide, elongate, 1·3 × length of tegumen + uncus; uncus lobes slender, extending a little beyond apices of valvae, fused caudally, forming shallow and inconspicuous ventral hook, moderately sclerotized, setose. Subscaphium weakly sclerotized, ribbon-like. Juxta weakly sclerotized, heart-shaped, contiguous with M-shaped posteriorly-directed extension of medioventral margin of vinculum; transtilla inverted U-shaped, closely associated with small, digitate setose lobes at bases of valvae. Valva short, deeply cleft (emarginate); costa with shallow, lobe-like subapical process and broad, thorn-shaped process at one-half; ventral lobe with strongly dentate ventral margin, dentations regular and digitate at apex, forming a pectinifer with about 10 spines, but irregular and shallow in basal two-thirds. Aedeagus elongate, about 20 × as long as broad at mid-length, lacking carinae; vesica with line of 70–80 small, strong cornuti from base to apex.

GENITALIA ♀. Unknown.

DISTRIBUTION. Ryukyu Is.

BIOLOGY. Unknown.

MATERIAL EXAMINED. 1 ♂.

Holotype ♂, **Ryukyu Is.**: Iriomote, Maire-gawa, 8.ix.1965 (*Arita*) (genitalia slide no. 1060 [Robinson]; coll. S. Moriuti, Osaka).

REMARKS. Externally practically identical with *sistrata* and *formosana*, this species has, like *formosana*, a more slender saccus than *sistrata* (in which the saccus is only about twice as long as wide); unlike *formosana*, the medioventral margin of the vinculum has an M-shaped process protruding between the valvae and contiguous with the weak juxta. The valva of *iriomotensis* resembles that of *formosana* in having a pectinifer (unlike *sistrata*), but the more proximal processes of the ventral margin of the valva are less ordered and there is no strong spine from the mid-point of the margin as in *formosana*. The costa of the valva has a stronger thorn-like process situated further proximad than that of *formosana*.

The *clonodes*-group

DIAGNOSIS. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with mottled coloration forming cryptic, coarse 'moss' pattern. Male lacking coremata in eighth abdominal segment. Tegumen unbroken, completely sclerotized dorsally; valva with deep emargination forming longitudinal cleft; juxta complex, entire, not divided medially; vesica with spicular cornuti; aedeagus with spicular or spinose carinae.

CONSPICUOUS AUTAPOMORPHIES. See species' description.

DISTRIBUTION. Australian region.

Morophaga clonodes (Meyrick) comb. n.

(Figs 75, 138, 172)

Scardia clonodes Meyrick, 1893: 523. Holotype ♂, AUSTRALIA (BMNH) [examined].
Scardia porphyrea Lower, 1903: 74. Holotype ♀, AUSTRALIA (SAM) [examined]. **Syn. n.**
Scardia maculosa Diakonoff, 1949: 317. Holotype ♀, BURU (RNH) [examined]. **Syn. n.**

ADULT (Fig. 75). ♂♀, 18–26 mm (♀ from Emirau I., 15 mm). Vertex and frons cream mixed with brown. Labial palpus cream flecked with brown, brown spot on outer surface of third segment. Maxillary palpus whitish, flecked with brown above on second and third segments. Antennal scape whitish, base brown dorsally, pecten bristles cream; pedicel ochreous, dark brown dorsally; flagellum dull buff, some darker dorsal scales towards base; cilia 1·5–2·0 × (♂) or 0·4 × (♀) flagellar diameter. Thorax and tegula ochreous cream, strongly speckled with brown anteriorly. Forewing cream marked with orange-brown on veins and strongly mottled with dark brown. Hindwing ochreous grey with violet iridescence, some paler apical mottling. Legs ochreous cream, strongly flecked with dark brown; foreleg and mid-leg dark brown above but pale at articulations and across middle of mid-tibia; scaling on upper surface of hind tibia not flecked, distinctively ochreous; outer mid-tibial spur 0·4 length of inner spur; outer proximal hind tibial spur 0·5 length of inner spur.

GENITALIA ♂ (Fig. 138). Coremata absent. Saccus very broad, 1·25 × as long as wide, elongate, 1·3 × length of tegumen + uncus; uncus lobes small, infolded ventrad, moderately sclerotized, setose. Subscaphium not developed. Juxta a small plate lying dorsal to large m-shaped ventrocaudal extension of vinculum which broadly separates valvae; transtilla not developed. Valva highly modified, complex, with pair of strongly sclerotized, blade-shaped ventral lobes, strong mediocostal spine and elongate, setose basicostal lobe extending almost twice length of remainder of valva; setose lobes at bases of valvae probably represented by extensive setose basidorsal area between basicostal lobe and anellus. Aedeagus slender, 15 × as long as broad at mid-length, with minute subapical thorn-like carinae; vesica with fine spicular cornuti.

GENITALIA ♀ (Fig. 172). Intersegmental membrane between seventh and eighth segments with pair of lateroventral pockets, each with conspicuously scobinate lining. Eighth tergite quadrate, shorter than eighth sternite, with row of about 8 strong subterminal setae and 4 smaller terminal setae; eighth sternite very short laterally, produced mediocaudally to form a sterigma terminating in a pair of lobes, each with three strong terminal setae and numerous smaller setae; ostium at one-half length of sterigma. Antrum almost one-half length of apophyses anteriores, strongly sclerotized and longitudinally ridged; inception of ductus seminalis just posterior to anterior margin of eighth sternite. Ductus bursae and corpus bursae contiguous, pear-shaped, extremely thin-walled, not reaching apices of apophyses anteriores; signa absent.

DISTRIBUTION. (?)Moluccas (Buru); Australia; New Guinea (Emirau I., Dyaul I.); Norfolk I.

BIOLOGY. Specimens in the BMNH collection have been bred from fungus on the roots of *Acacia aulacocarpa* and from dead wood of *Prunus persica*.

MATERIAL EXAMINED. 72 ex.

Holotype ♂ (of *Scardia clonodes*), **Australia**: New South Wales, South Creek, 2.iii.1878 (*Meyrick*) (BMNH). Holotype ♀ (of *Scardia porphyrea*) (more than 20 fragments in gelatine capsule), **Australia**: Queensland, Cooktown (SAM). Holotype ♀ (of *Scardia maculosa*) (head and thorax on pin; about 15 fragments in two gelatine capsules), **Moluccas**: Buru, Station 1, 1922 (*Toxopeus*) (RNH).

Australia: 51 ex., Queensland, Townsville, ex fungus on roots of *Acacia aulacocarpa*, various emergence dates, iii, iv.1901 (*Dodd*) (BMNH); 16 ex., Queensland, Townsville, Toowong, Dawson R., Rockhampton, Herberton, Peak Downs, Huberton Hills, Kuranda, various dates (*Dodd, Barnard*), including 1 ♂ from Toowong, ex 'dead wood of Peach tree' (BMNH). **New Guinea**: 1 ♀, St Matthias Group, Emirau ('Squally') I., viii.1923 (*Eichhorn*) (BMNH); 1 ♂, Dyaul I., Sumuna, 7.iii.1962 (*Noona Dan Exp.*) (ZM). **Norfolk I.**: 1 ♀, in house J.E./Red Road, 170 m, 18.x.1977 (*Jowett & Jowett*) (BMNH).

REMARKS. While the general appearance of *clonodes* is typical of that of other *Morophaga* (with the exception of members of the *bucephala*-group), well-preserved specimens are distinctive in that the hindwing has violet iridescence and the erect scales on the upper surface of the hind tibia are bright ochreous. The genitalia of both sexes are distinctive. In the female, the scobinate intersegmental pockets are a conspicuous autapomorphy; however, shallow and smooth-surfaced pouches (no more than accentuated infolding of the membrane) are found also in the *choragella*-group. The highly modified male genitalia are peculiar within the genus in that coremata are absent (as in three of the four species of the *sistrata*-group) and the subscaphium and transtilla are not developed. The form of the valva is also highly characteristic.

Scardia maculosa Diakonoff was described from a single specimen without abdomen. In the original description the specimen is said to be a male. Upon receipt of the holotype, it was found that the specimen, mounted on elder pith (and already, apparently, stuck together with glue), had broken loose in transit and was very badly damaged. The fragments revealed, however, the typical venation of a *Morophaga* with R_3 and R_4 stalked at one-half, wing-pattern (rubbed) typical of the *sistrata*-group or *clonodes*, the outer mid-tibial spur 0·4 the length of the inner spur and the outer proximal hind tibial spur 0·5 the length of the inner spur. The antennae are those of a female, with a cilia length of about 0·6 the flagellar diameter. The comparative length of the tibial spurs probably precludes this species from the *sistrata*-group. Diakonoff's reference to the iridescence of the hindwing is suggestive of affinity to *clonodes*. Accordingly, *maculosa* is tentatively synonymized with *clonodes* although this requires a dramatic extension of the geographical range of the latter species.

The *choragella*-group

DIAGNOSIS. Outer mid and proximal hind tibial spurs >0·4 length of inner spurs. Forewing with mottled coloration forming cryptic, coarse 'moss' pattern. Male with coremata in eighth abdominal segment; coremata associated with elongate, rod-like apodemes at anterior corners of eighth sternite but apodemes lacking in *fasciculata*. Tegumen broken dorsally by at least a membranous suture line; valva with deep emargination forming longitudinal cleft; juxta simple, entire, not divided medially; vesica with spicular cornuti; aedeagus with spicular or spinose carinae.

CONSPICUOUS AUTAPOMORPHIES. Only group within *Morophaga* with rod-like apodemes from anterior corners of eighth segment (but see *Diataga* and *Necroscardia*); however, apodemes absent in *fasciculata*; valva with large, hook-shaped articulated process (absent in *fasciculata* but the large apical depression in the valva suggests that the ancestor of this species may have had this process).

DISTRIBUTION. Western and eastern Palaearctic region.

Keys to species of the *Morophaga choragella*-group

Males (males of *kobella* are unknown)

1 Valva lacking sickle-shaped articulated process; ventral margin of valva with dense bundle of rod-like setae (Fig. 139). (Japan) .... ***fasciculata*** (p. 133)
– Valva with large sickle-shaped articulated process; ventral apex of valva lacking rod-like setae ... 2
2 Ventral apex of valva forming a single strong hook. (Caucasus) .... ***hyrcanella*** (p. 132)
– Ventral apex of valva rounded, with marginal line of small, shallowly dentate processes. (western Palaearctic region, east to Novosibirsk) .... ***choragella*** (p. 131)

Females

1 Antrum elongate, extending anteriorly beyond apices of apophyses anteriores (Fig. 177) ***kobella*** (p. 133)
– Antrum short, not reaching one-half length of apophyses anteriores.................................. 2
2 Eighth tergite separating dorsolateral extensions of eighth sternite; ventral margin of ostium transverse (Fig. 178). (Japan) .... ***fasciculata*** (p. 133)
– Eighth tergite posterior to dorsolateral extensions of eighth sternite which almost meet dorsally; ventral margin of ostium V-shaped, deeply emarginate. (Western Palaearctic region; Caucasus, Siberia) 3
3 Lateral sclerotization of eighth sternite extending dorsally and caudally beyond lobes that form lateral margins of ostium. (Caucasus) .... ***hyrcanella*** (p. 132)
– Lateral sclerotization of eighth sternite not extending beyond lobes that form lateral margins of ostium. (Western Palaearctic region east to Novosibirsk) .... ***choragella*** (p. 131)

Morophaga choragella ([Denis & Schiffermüller])

(Figs 76, 189–192)

Tinea choragella [Denis & Schiffermüller], 1775: 137. [AUSTRIA.] No type-material extant.
Noctua boleti F., 1777: 282. [EUROPE.] No type-material extant. [Synonymized by Charpentier, 1821: 127.]
Tinea fungella Thunberg, 1794: 93. [SWEDEN.] No type-material extant. [Synonymized by Karsholt & Nielsen, 1976: 21.]
Tinea mediella Hübner, 1796: 19, pl. 3, fig. 19. [EUROPE.] No type-material extant. [Synonymized by Charpentier, 1821: 127.]

ADULT (Curtis, 1836: pl. 591 (colour); Duponchel, 1838: pl. 288, fig. 3 (colour); Spuler, 1910: pl. 91, fig. 31 (colour); Wood, 1839: pl. 49, no. 1565 (colour); Zagulajev, 1973: fig. 51; Fig. 76). ♂♀, 21–30 mm. Vertex and frons cream. Labial palpus cream mixed with brown, apical segment with ill-defined subapical and basal brown rings. Maxillary palpus cream mixed with light brown, dark brown scales above on third segment. Antennal scape cream, basally mixed with brown on dorsal surface; pedicel dark brown above; flagellum ochreous, scales tipped with grey; cilia 3 × (♂) or 0·7 × (♀) flagellar diameter. Thorax and tegula cream, dark brown anteriorly. Forewing cream marked with orange-brown (particularly along veins), medium brown and dark brown (overall appearance distinctly olivaceous, particularly in fresh specimens). Hindwing grey, paler flecks at apex; bases of fringe scales paler. Legs cream; foreleg and mid-leg strongly marked with dark brown above in basal half of each segment; hindleg similarly marked with light grey; outer mid-tibial spur 0·5 length of inner; outer proximal hind tibial spur 0·7 length of inner.

GENITALIA ♂ (Petersen, 1957: fig. 240; Zagulajev, 1968: fig. 9, 1973: fig. 52). Coremata present in eighth abdominal segment, associated with elongate, rod-like apodemes from eighth sternite. Saccus 0·6 length of tegumen + uncus; uncus lobes elongate, digitiform, moderately sclerotized, setose. Subscaphium ill-defined, ribbon-like. Juxta plate-shaped, contiguous with vinculum; transtilla inverted elongate U-shaped, closely associated with setose lobes at bases of valvae. Valva divided by deep emargination into dorsal and ventral lobes; ventral lobe rounded, ventral margin with row of shallowly dentate processes; dorsal lobe with deep recess accommodating mobile and strongly sclerotized hook-shaped process. Aedeagus curved, 9 × as long as broad, apex tapered gently, with fine spicular carinae; vesica with fine spicular cornuti.

GENITALIA ♀ (Petersen, 1957: fig. 241; Zagulajev, 1968: fig. 10, 1973: fig. 53). Eighth tergite displaced caudally, shield-shaped, with slight posteromedial emargination; caudal margin with about 10 strong setae. Eighth sternite broad, lateral margins extended dorsally to almost meet anterior to the displaced tergite; ventrally a broad plate, extended caudally into pair of broad lobes with narrow emargination between them, overlying ostium. Antrum funnel-shaped and smooth-walled to inception of ductus seminalis at 0·6 ventral length of eighth sternite anteriorly, then cylindrical with longitudinal ribbing, extending 0·4 length of apophyses anteriores. Ductus bursae short, 0·4 length of antrum. Corpus bursae very thin-walled, ovoid, extending slightly beyond apices of apophyses anteriores; signa absent.

DISTRIBUTION. Probably all European countries north of the Mediterranean, including Scandinavia and Finland; Bulgaria and Rumania; U.S.S.R. east to Novosibirsk Province (Zagulajev, 1973); Asia Minor. The identity of the specimen recorded from China (Yunnan) by Meyrick (1938) has not been confirmed.

BIOLOGY. Described by a number of European authors – see Zagulajev (1973) for a bibliography. The larva has been described in detail by Hinton (1956: 258, figs 1–14). This is a widespread and common species that has been bred from many species of bracket-fungi and from dead wood permeated by fungal hyphae.

MATERIAL EXAMINED. 346 ex., larvae and pupae, from various localities (see 'Distribution') (BMNH, ZI).

REMARKS. Males of *choragella* and *hyrcanella* may be recognized by the conspicuous articulated hook set in the dorsal lobe of the valva; however, this hook is absent in *fasciculata* although the depression in the valva that accommodates the hook in the other species is present. The male of *kobella* is unknown. *M. choragella* is smaller than *hyrcanella* (which is restricted to the Caucasus) and the ventral lobe of the valva (formed into a hook in *hyrcanella*) has a marginal row of shallowly dentate processes. Females are characterized by the short antrum and dorsally extended eighth sternite of which the ventral caudally-directed lobes are the posteriormost part.

Records of this species from Japan (e.g. Inoue, 1954: 17) are erroneous and may refer instead to either *kobella* (of which I have seen only a single female, in BMNH) or *fasciculata* or, more improbably, to *Scardia amurensis* (Zagulajev) (*q.v.*).

Morophaga hyrcanella Zagulajev

(Fig. 77)

Morophaga hyrcanella Zagulajev, 1966: 639, fig. 3. Holotype ♀, U.S.S.R. (ZI) [examined].
Morophaga talyshensis Zagulajev, 1966: 641, fig. 4. Holotype ♂, U.S.S.R. (ZI) [examined]. [Synonymized by Zagulajev, 1973: 76.]

ADULT (Zagulajev, 1973: pl. 1, fig. 2 (colour); Fig. 77). ♂, 28 mm; ♀, 32 mm. Similarly patterned to *choragella* but frons and vertex more brownish; antennal cilia 4·0 × (♂) or 1·0 × (♀) flagellar diameter; thorax and tegula brown; forewing with dark brown scaling more extensive, forming a V-shaped medial fascia; hindwing grey-brown; legs with dark markings more intense and extensive.

GENITALIA ♂ (Zagulajev, 1966: fig. 4; 1973: fig. 56). Similar to *choragella* but ventral lobe of valva with hook-shaped ventral extension; aedeagus not as strongly curved.

GENITALIA ♀ (Zagulajev, 1966: fig. 3; 1968: fig. 12; 1973: figs 19b, 57). Similar to *choragella* but sclerotization of eighth sternite extended caudally beyond lobes that form lateral margins of ostium.

DISTRIBUTION. U.S.S.R. (Transcaucasus).

BIOLOGY. Described by Zagulajev (1966; 1973: 78).

MATERIAL EXAMINED. 45 ex., pupae.

Holotype ♀ (of *Morophaga hyrcanella*), **U.S.S.R.**: Transcaucasia, Talysh, Lenkoran dist., Sarakh, 19.vii.1964 (*Zagulajev*) (ZI). Holotype ♂ (of *Morophaga talyshensis*), **U.S.S.R.**: Transcaucasia, Talysh, R. Lyakar, nr Mamagon (22 km W. of Pensar), Astara dist., 2100 m, 10.viii.1962 (*Zagulajev*) (ZI).

U.S.S.R.: 1 ♂, 1 ♀, 1 pupa, Talysh, L. Girkanskiy, 20.ix.1967 (*Zagulajev*) (BMNH). Also a further 41 ex., 30 pupae, various Transcaucasian localities (see Zagulajev, 1973: 78) (ZI).

REMARKS. More strongly marked than *choragella, hyrcanella* is also distinguished externally by its larger size and more elongate antennal cilia in both sexes. Differences in genitalia are outlined above.

Morophaga fasciculata sp. n.

(Figs 78, 139, 178)

ADULT (Fig. 78). ♂, 15–18 mm; ♀, 21 mm. Vertex and frons cream. Labial palpus with apical segment uniformly pale, outer surface of second segment evenly flecked with brown. Maxillary palpus cream, some darker scaling above on second segment. Antennal scape whitish; pedicel brown above; flagellum ochreous; cilia 3 × (♂) or 0·5 × (♀) flagellar diameter. Thorax and tegula cream marked with brown, dark brown anteriorly. Forewing cream, patterned with brown (specimens worn and slightly faded), pattern similar to *kobella* and to species of the *sistrata*-group. Hindwing grey. Legs ochreous cream; foreleg and mid-leg brownish above, paler at articulations, mid-tibia with cream medial band; outer mid-tibial spur 0·4 length of inner; outer proximal hind tibial spur 0·5 length of inner.

GENITALIA ♂ (Fig. 139). Eighth segment with small coremata but no associated apodemes; eighth sternite with broadly U-shaped posterior emargination. Saccus broad, U-shaped, as long as tegumen + uncus; uncus lobes shorter than saccus, simple, only moderately sclerotized, setose. Subscaphium well-sclerotized, rod-like. Juxta small, quadrate, weakly sclerotized; transtilla not developed. Valva with broad, deep emargination; with dense dorsoventral band of slender, flattened scales on outer surface; separate tuft of close-set similar scales on ventral margin; apices of ventral and dorsal lobes serrate, a shallowly dentate ridge running anteriorly down internal face of valva; line of 5 or 6 peg-like spines at apex of costa, smaller peg-like spines on internal face of dorsal lobe. Membranous lobe at base of valva elongate, densely hirsute. Aedeagus short, 7 × as long as broad, with three lobate anteriorly-directed carinae; vesica with minute, inconspicuous spicular cornuti.

GENITALIA ♀ (Fig. 178). Eighth tergite slightly longer than eighth sternite; eighth sternite short, with lateral membranous pouches in intersegmental membrane, caudal margin produced into pair of short lateral processes either side of ostium, each process with about 6 strong apical setae. Antrum broad, thick-walled, almost twice length of eighth sternite, with ill-defined longitudinal ridging. Ductus bursae + corpus bursae thin-walled, contiguous, elongately pear-shaped.

DISTRIBUTION. Japan.

BIOLOGY. The type-species was bred from the fungus *Trametes kusanoana* Imazeki, adults emerging in late June and early July.

MATERIAL EXAMINED. 4 ex.

Holotype ♂, **Japan**: Honshu, Nara, bred from *Trametes kusanoana* Imazeki, coll. 29.vi.1965, em. 4.vii.1965 (*Arita*) (genitalia slide no. 1048 [Robinson]; coll. S. Moriuti, Osaka).

Paratypes. 2 ♂, 1 ♀, data as holotype but em. 2.vii. and 30.vi.1965 (genitalia slide no. 1049 [Robinson]; coll. S. Moriuti, Osaka; BMNH).

REMARKS. Similarities between the male genitalia of *fasciculata*, *choragella* and *hyrcanella* are marked, but *fasciculata* is distinctive in lacking the strong, articulated hook-like process set in the valva of the last two species. The deep emargination of the valva that accommodates the hook in the other two species is also present in *fasciculata*. Neither *choragella* nor *hyrcanella* possess the distinctive bundle of close-set flattened scales on the ventral margin of the valva that is present in *fasciculata*. Females of *fasciculata* are very similar externally to *kobella*. Separation of the two species, while simple enough using genitalic characters (the antrum of *kobella* is longer than the apophyses anteriores, but considerably shorter in *fasciculata*), is unsafe using external characteristics only, to judge from the material presently available. Comparison of fresh material of the two species may, however, reveal perfectly good pattern differences.

Morophaga kobella sp. n.

(Figs 79, 177)

ADULT (Fig. 79). ♀, 23 mm. (Specimen slightly faded and badly discoloured by fine, dark dust.) Vertex and frons cream. Labial palpus cream flecked with dark brown, but whitish on inner surface. Maxillary palpus cream flecked with brown; dark brown scales above on second segment. Antennal scape cream flecked with brown; pedicel similar; flagellum medium brown; cilia 0·5 × flagellar diameter. Thorax and tegula cream flecked with brown, dark brown anteriorly. Forewing cream marked with orange-brown, medium brown and dark brown, pattern similar to that of *choragella* but dark costal markings denser, better-defined, antemedial costal spot not as elongate. Hindwing charcoal grey. Legs cream flecked with brown; foreleg and mid-leg strongly marked with dark brown above but cream at articulations; mid-tibia with cream medial band; hind spurs strongly marked with dark brown; outer mid-tibial spur 0·4 length of inner; outer proximal hind tibial spur 0·5 length of inner.

Genitalia ♂. Unknown.

Genitalia ♀ (Fig. 177). Eighth tergite broad, shield-shaped, slightly longer than eighth sternite, with subapical row of 4 strong setae surrounded by numerous scattered smaller setae. Eighth sternite broad, strongly sclerotized, with rectangular medial emargination posteriorly; lobes either side of emargination each with 3 apical setae; anteriorly, surface of sternite strongly ridged and folded to form strong ventral keel. Antrum smooth-surfaced posteriorly, further anteriorly thick-walled with strong longitudinal ridges on inner surface, extending beyond apices of apophyses anteriores. Ductus bursae short, convoluted, offset to the left. Corpus bursae elongately ovoid; signa absent.

Distribution. Japan.

Biology. Unknown.

Material examined. 1 ex.
Holotype ♀, **Japan**: [Honshu], Kobe, 6.vii.1927 (*Lewis*) (genitalia slide no. 13116; BMNH).

Remarks. The external apperance of *kobella* is similar to that of members of the *choragella*-group (*choragella*, *fasciculata*) and the *sistrata*-group (*sistrata*, *formosana*, *iriomotensis*). The bursa copulatrix is as elongate as in members of the *sistrata*-group but the antrum is internally ridged, as in the *choragella*-group. The tibial spurs are of a length comparable with that of members of the *choragella*-group rather than the *sistrata*-group. However, the present placement of *kobella* should be considered provisional until the male is discovered. This species may be separated from all other *Morophaga* species by its enormously elongate antrum.

Taxa incertae sedis

LEPTOZANCLA Meyrick

Leptozancla Meyrick, 1920: 107. Type-species: *Leptozancla talaroscia* Meyrick, 1920: 108, by original designation and monotypy.

This genus was redescribed by Gozmány & Vári (1973) and by Robinson (1976*a*). The single species here included, *L. talaroscia* Meyrick, was described by Meyrick (1920: 107) from two males from Mt Kenya, both in poor condition. No further specimens of *Leptozancla* have been identified since its original description. In the absence of further material, the taxonomic position of *Leptozancla* must remain in doubt. However, it is probably a scardiine. Gozmány & Vári (1973) and Robinson (1976*a*) treated *Philagrias* (see below) as a synonym of *Leptozancla*. However, in the light of the morphological differences between other scardiine genera this synonymy is not appropriate.

L. talaroscia has densely ciliate antennae, the cilia as long as the flagellar diameter. The genitalia are characterized by the valvae having been apparently entirely supplanted by the juxta as no typical valval apodeme is evident: the juxta (if, indeed, the structure is the juxta) forms a ventral complex resembling a pair of entirely fused valvae. The transtilla (and, possibly, remnants of the valval apodemes) forms a strongly sclerotized complex with four elongate and posteriorly-directed spines (labides) (Robinson, 1976*a*: fig. 65).

PHILAGRIAS Meyrick **gen. rev.**

Philagrias Meyrick, 1932*a*: 119. Type-species: *Philagrias zelotica* Meyrick, 1932*a*: 119, by monotypy.

The single species included here, *P. zelotica*, has been redescribed by Gozmány & Vári (1973) and by Robinson (1976*a*). It was described from a single male example in poor condition from the highlands of Ethiopia. No further specimens of *Philagrias* have been identified since its original description. In the absence of further material, its taxonomic position must remain in doubt. However, it is probably a scardiine.

Philagrias is distinguished by the antennae having very short cilia (0·5 × the flagellar diameter) which lie almost parallel to the axis of the flagellum. Previous authors have recorded that *Philagrias* lacks antennal cilia. The 'valva' bears extraordinarily large and complicated processes (?labides) arising from the modified valval apodemes (Robinson, 1976*a*: fig. 66). It is not certain whether the valva is present and forms part of a valve-juxta complex or whether it has been supplanted entirely by the juxta. In previous papers (1976*a*; 1981) I have assumed the structure to be the juxta on the grounds that no recognizably functional remnant of the valval apodeme remains.

Scardia tholerodes Meyrick

Scardia tholerodes Meyrick, 1894: 27. Syntypes, 3 ex., BURMA (?BMNH) [not found, not examined].

Other specimens collected at Koni in the Shan States by Manders and described by Meyrick in the same paper as *tholerodes* are in the BMNH collection (*ex* Meyrick collection). No specimens of *tholerodes* have been found, however. From Meyrick's original description, this taxon may be a member of the *Morophaga sistrata*-group.

Scardia pharetrodes Meyrick

Scardia pharetrodes Meyrick, 1934: 42. Holotype ♀, CHINA (?MNHU) [not found, not examined].

The whereabouts of the holotype of this species are in doubt: according to the original description it should be in MNHU, Berlin. However, it has not been mentioned by Petersen who has had access to the Berlin collections. Neither has it turned up in the Caradja collection of MINGA, Bucharest, despite a search on my behalf by Dr A. Popescu-Gorj. The possible affinities of this taxon are not evident from Meyrick's original description.

Scardia isthmiella Busck

Scardia isthmiella Busck, 1914: 65. Holotype ♀, PANAMA (NMNH) [examined].

The holotype of this species is in poor condition. It resembles superficially a *Daviscardia* species but the pale scaling of the terminal fascia does not extend along the dorsum. Davis (in prep.) will publish a description and illustration of it. The genitalia are nondescript, the eighth sternite hardly sclerotized, the ventral margin of the ostium lined with small setae and with a doubly crescentic outline (very shallowly m-shaped). The ductus bursae has irregular transverse constrictions in its posterior two-thirds and extends to two-thirds the length of the apophyses anteriores. The corpus bursae is small and ovate and lacks signa.

MATERIAL EXAMINED. 1 ex.
Holotype ♀, **Panama**: Porto Bello, v.1912 (*Busck*) (genitalia slide no. 20155; NMNH).

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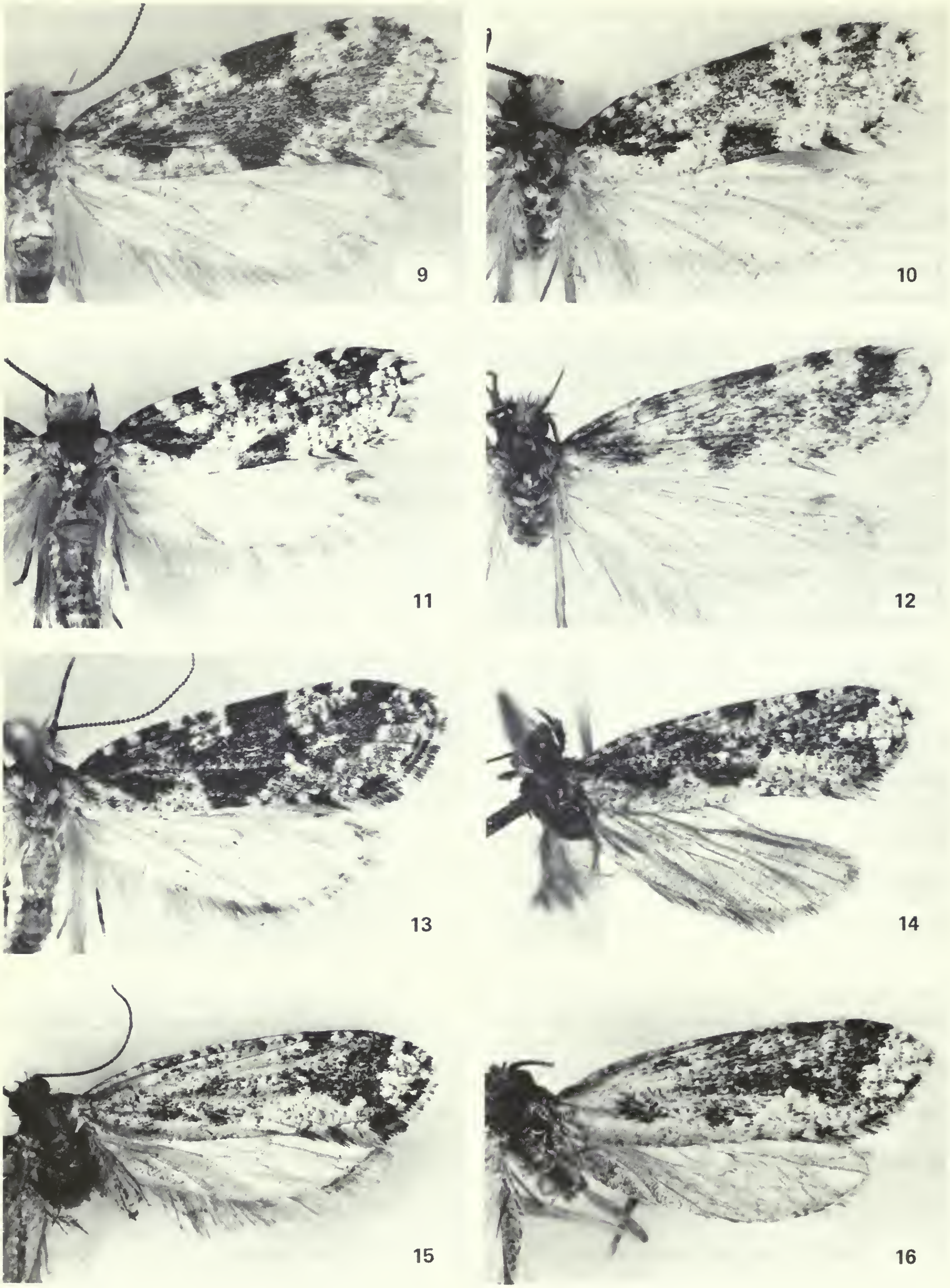
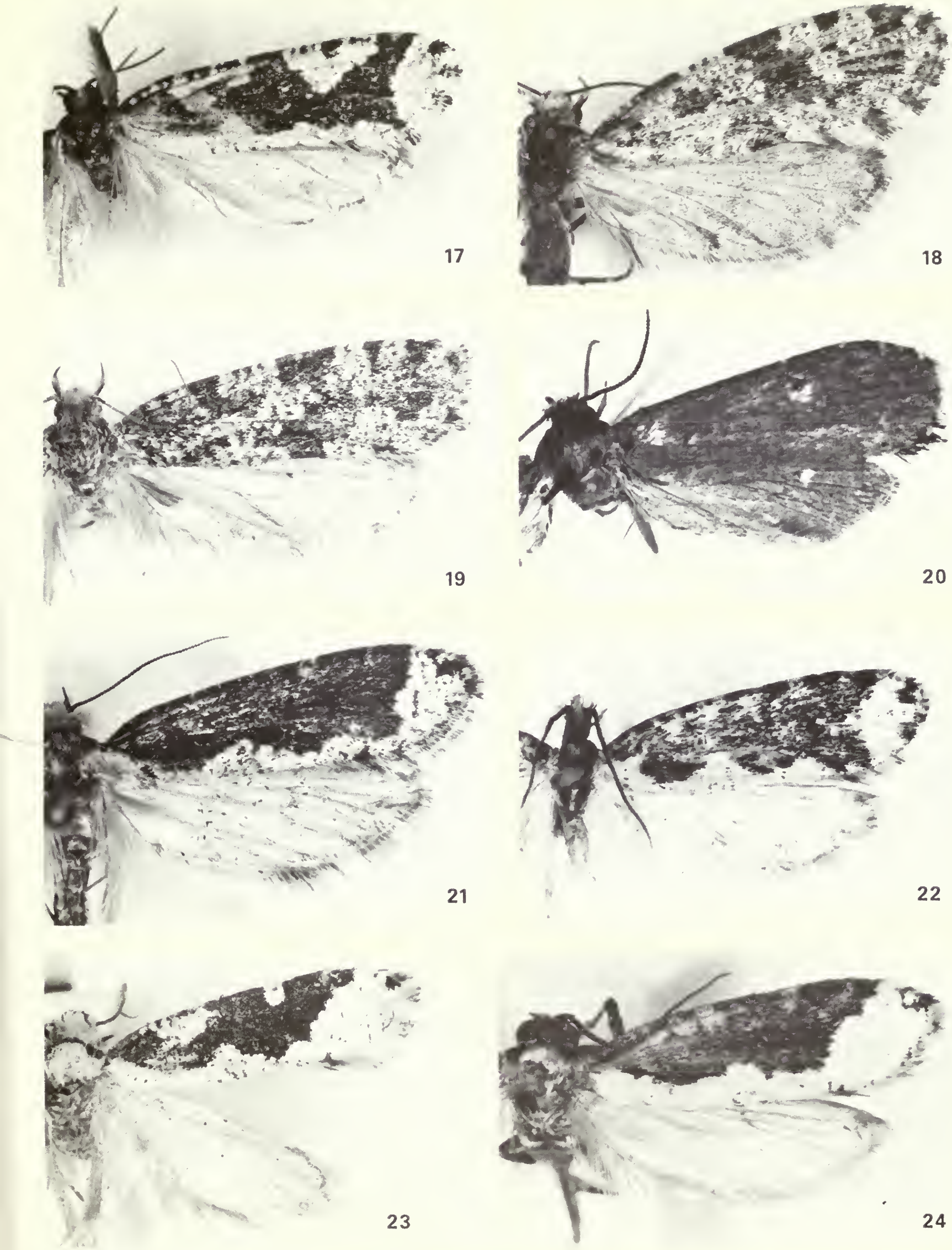
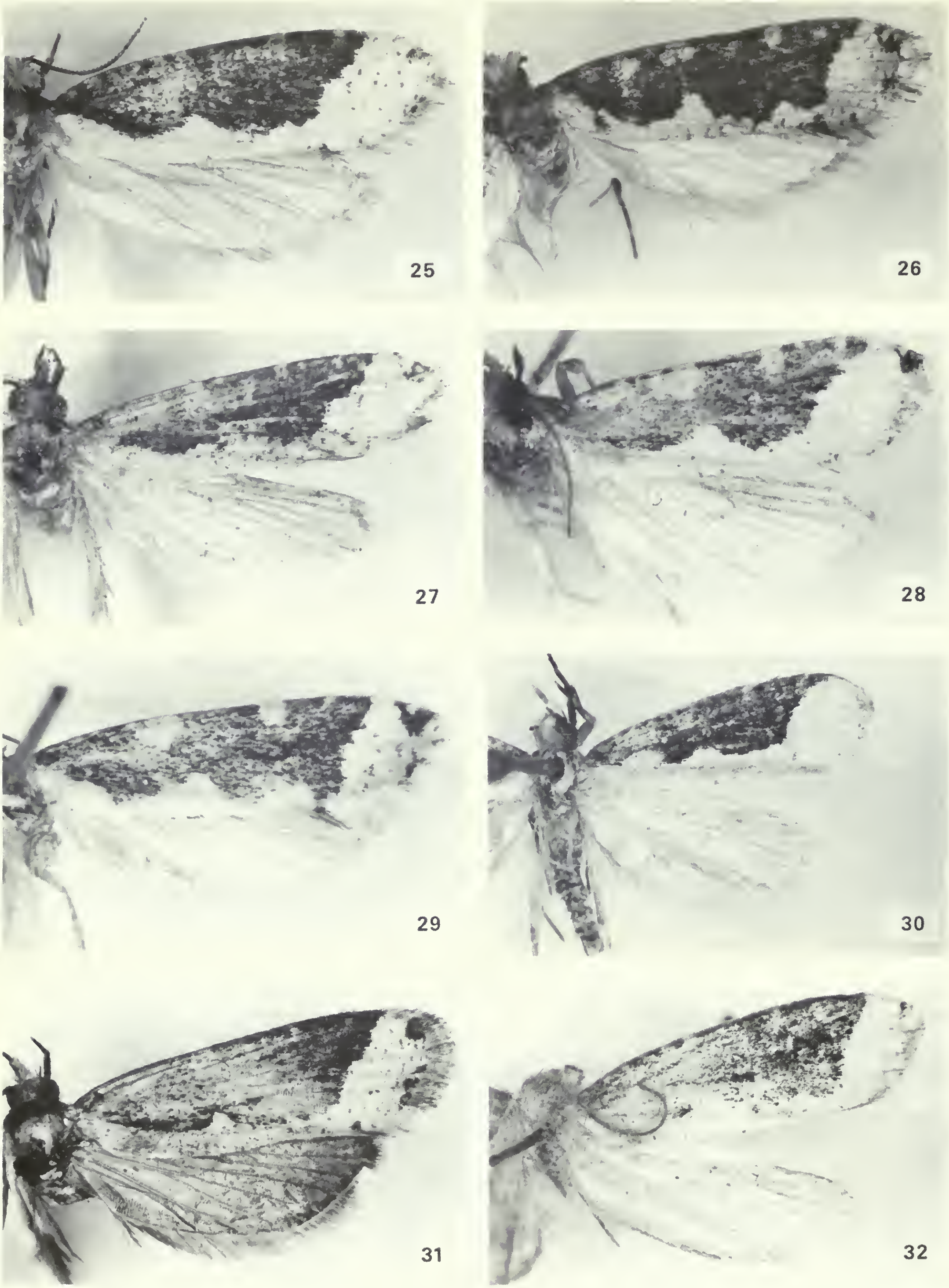


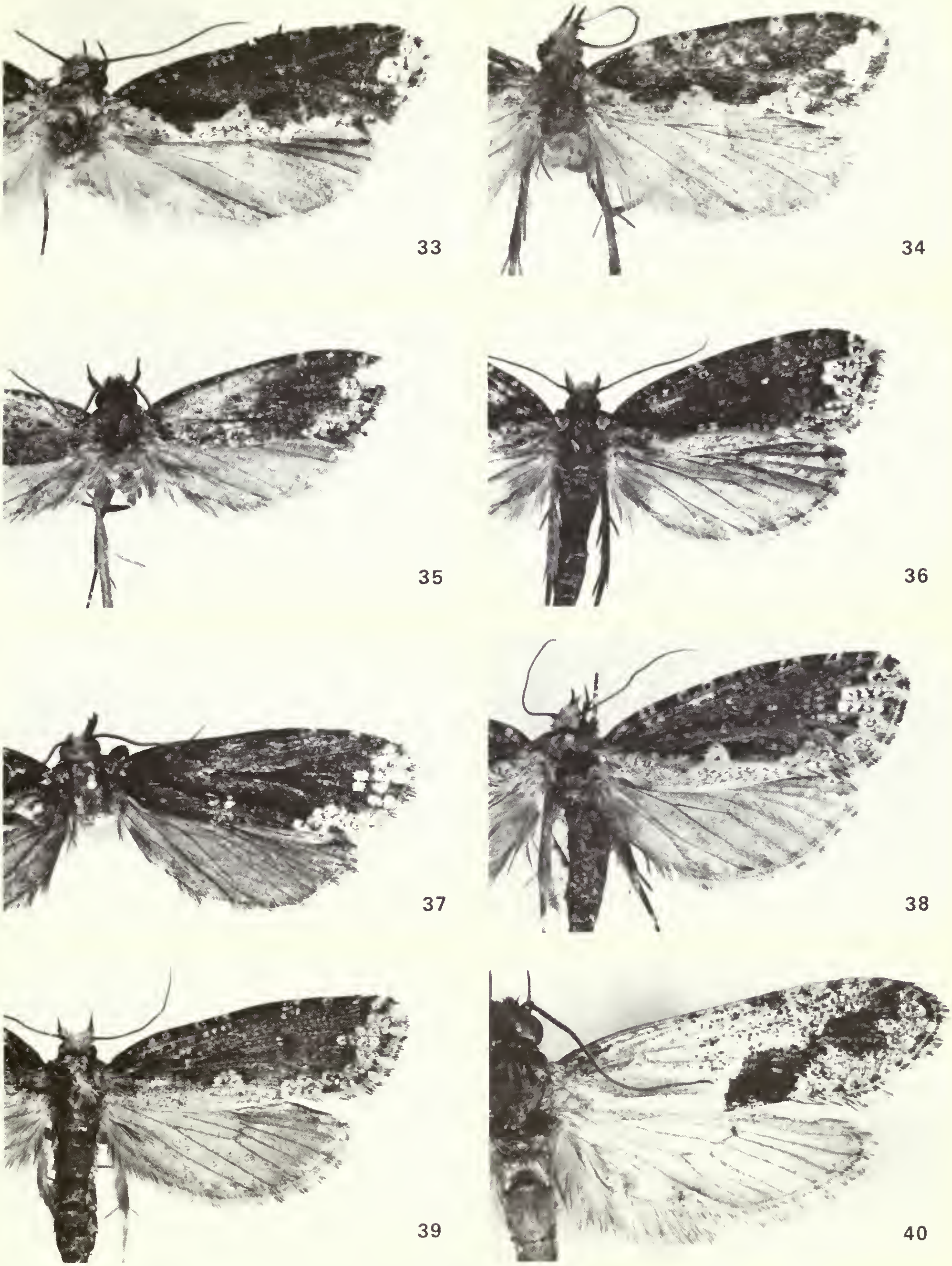
Figs 9–16 *Morophagoides* species. 9, *iranensis,* ♂; 10, *ussuriensis,* ♂; 11, *moriutii,* ♂ paratype; 12, *berkeleyella,* ♂ (Burney Mt.); 13, *burkerella,* ♂; 14, *montium,* ♀ holotype; 15, *pythium,* ♀ holotype; 16, *nimbiferum,* ♀ holotype.



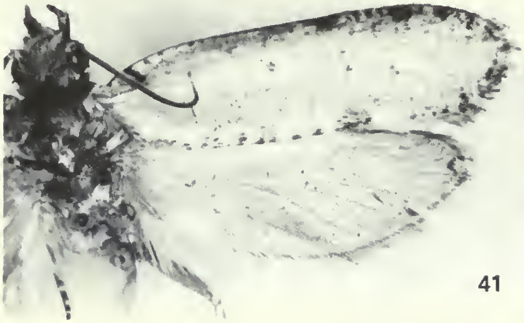
Figs 17–24 17, *Morophagoides iulina,* ♂ holotype. 18, 19, *Montescardia* species. 18, *tessulatellus,* ♀; 19, *fuscofasciella,* ♀ (North Carolina). 20, *Bythocrates drosocycla,* ♀. 21–24, *Daviscardia* species. 21, *coloradella,* ♀; 22, *radulella,* ♂ holotype; 23, *bimendella,* ♂ lectotype; 24, *beckeri,* ♂ holotype.



Figs 25–32 *Daviscardia* species. 25, *beckeri*, ♀ paratype; 26, *luctuosa*, ♂ lectotype; 27, *mackiei*, ♂ holotype; 28, *mackiei*, ♂ paratype; 29, *mackiei*, ♀; 30, *bicolorella*, ♂ paratype; 31, *lupulella*, ♀ holotype; 32, *hypocritella*, ♀ holotype.



Figs 33–40 33–39, *Scardia* species. 33, *anatomella,* ♀ lectotype; 34, *anatomella,* ♂ (Venezuela); 35, *assamensis,* ♂ holotype; 36, *amurensis,* ♀; 37, *alleni,* ♀ holotype; 38, *boletella*, ♀; 39, *caucasica*, ♀ paratype. 40, *Perilicmetis diplaca,* ♂ paratype.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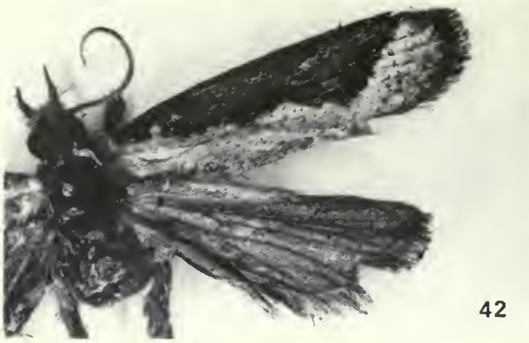
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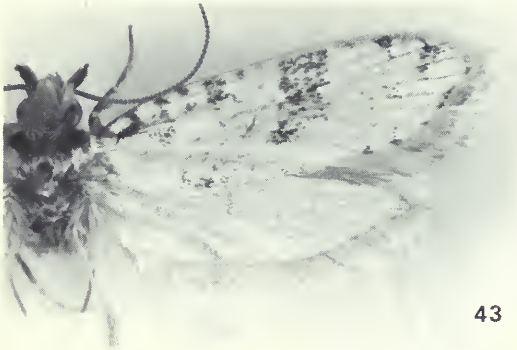
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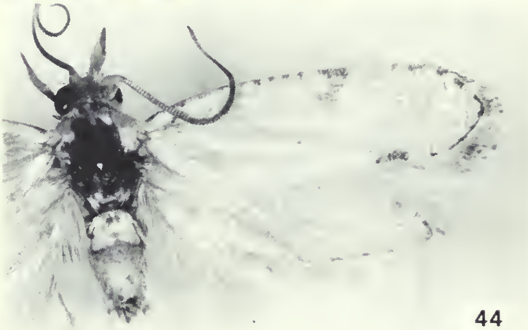
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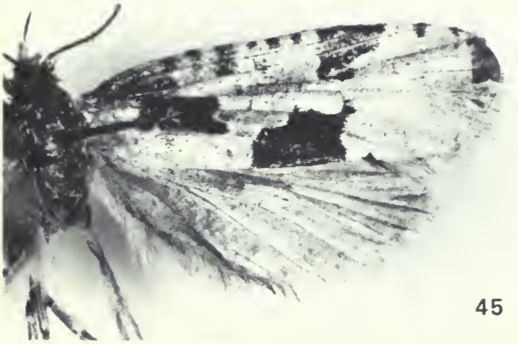
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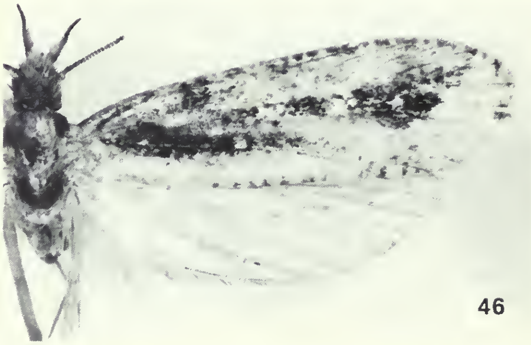
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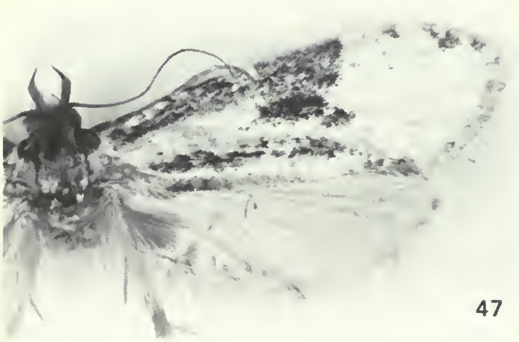
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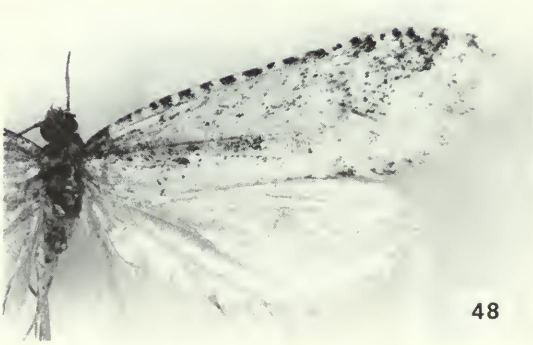
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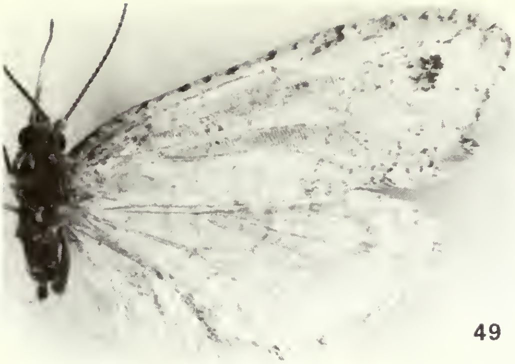
Figs 41–48 41, 42, *Moscardia* species. 41, *renitens,* ♂ holotype; 42, *varna,* ♂ holotype. 43, *Gentingia hollowayi,* ♂ holotype. 44, *Semeoloncha penicillata,* ♂ holotype. 45–47, *Cranaodes* species. 45, *stereopa,* ♀; 46, *oroya,* ♂ holotype; 47, *sequestrata,* ♀. 48, *Pectiniscardia prostylias,* ♂ holotype.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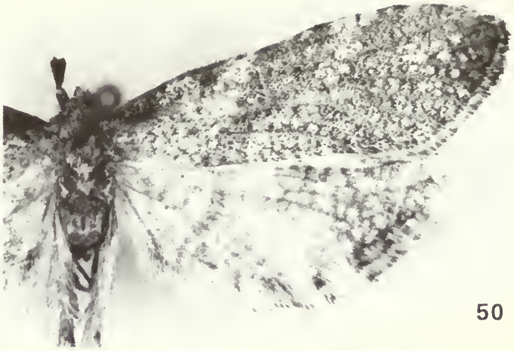
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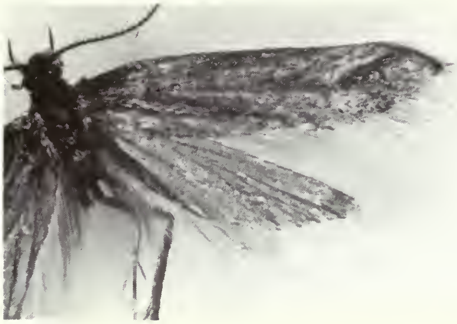
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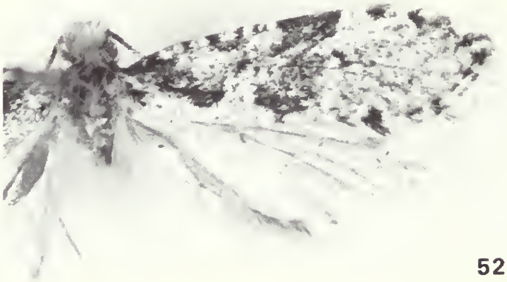
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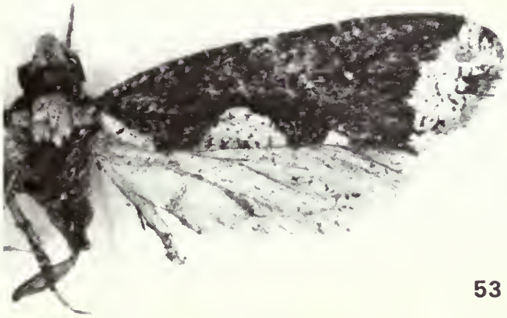
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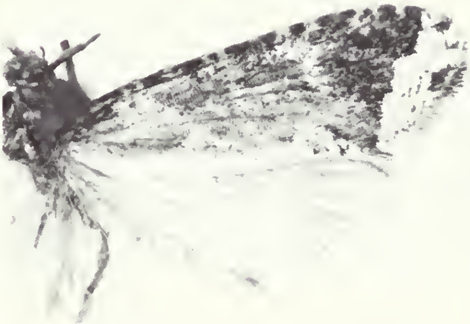
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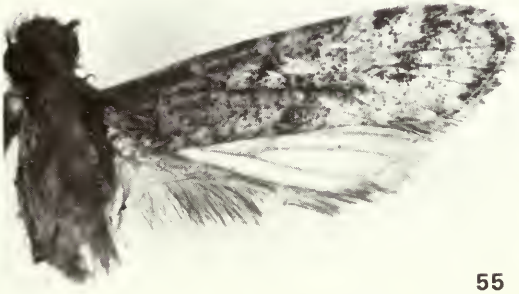
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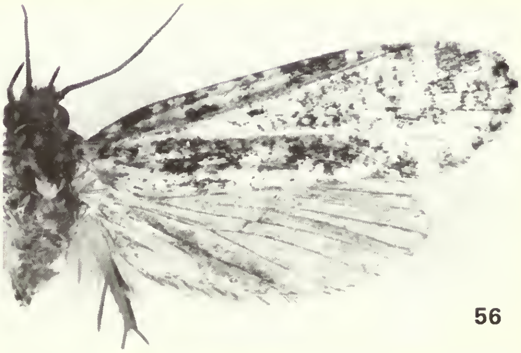
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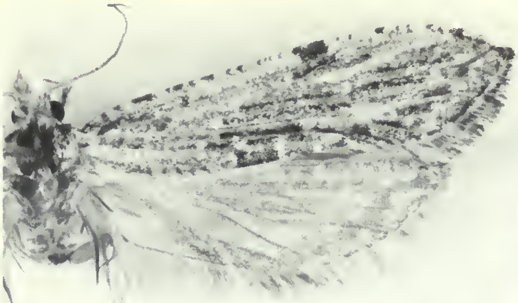
Figs 49–56 49, *Hormantris astragalopa,* ♂ holotype. 50, *Cnismorectis choritica,* ♂. 51, *Afroscardia capnochalca,* ♂ holotype. 52, *Scardiella approximatella,* ♀. 53, 54, *Necroscardia* species. 53, *funeratella,* ♂ lectotype; 54, *morticina,* ♂ holotype. 55, 56, *Miniscardia* species. 55, *minimella,* ♂ (Costa Rica); 56, *minimella,* ♀ (Costa Rica).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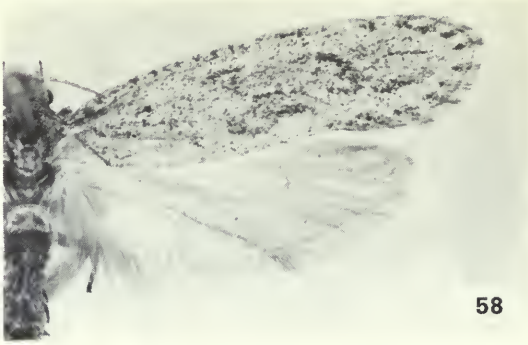
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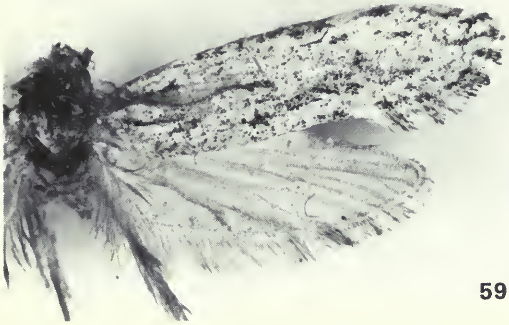
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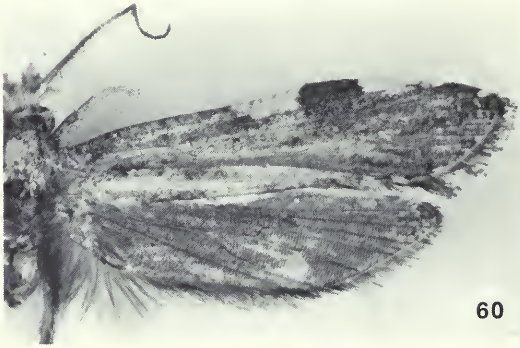
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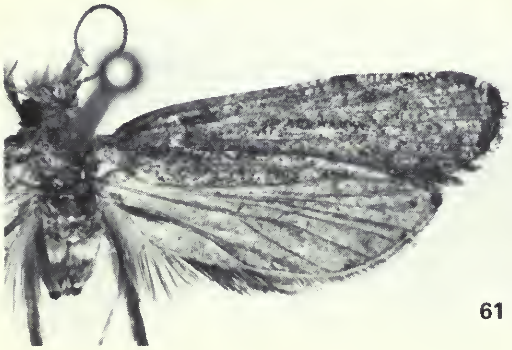
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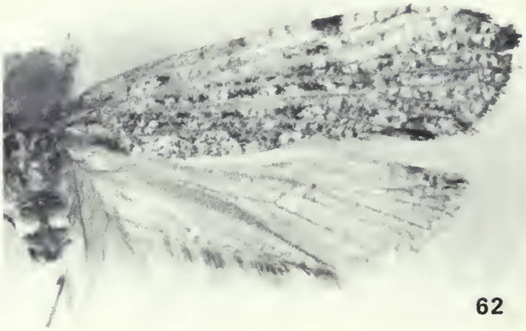
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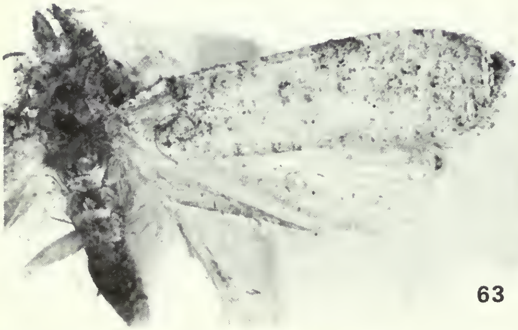
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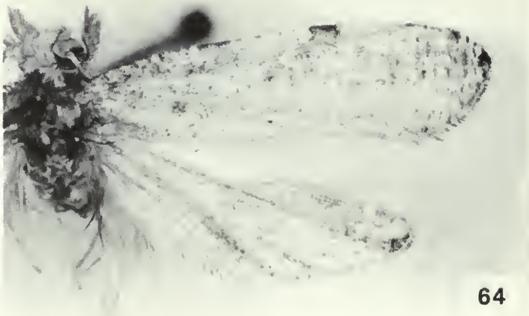
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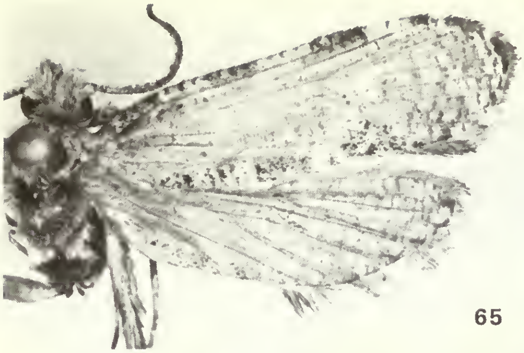
Figs 57–64 57–59, *Amorophaga* species. 57, *rosemariae,* ♀ holotype; 58, *cryptophori,* ♂; 59, *japonica,* ♂ holotype. 60–64, *Diataga* species. 60, *leptosceles,* ♂ lectotype; 61, *frustraminis,* ♂ paratype; 62, *brasiliensis*, ♂ holotype; 63, *compsacma,* ♂ paralectotype; 64, *levidensis*, ♂ holotype.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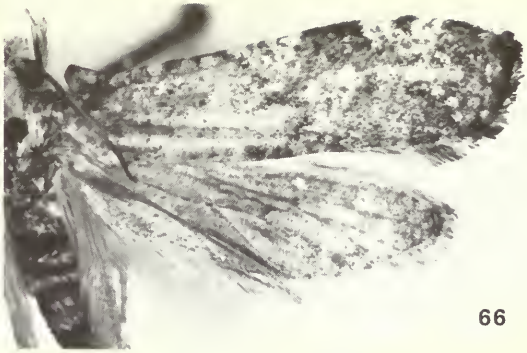
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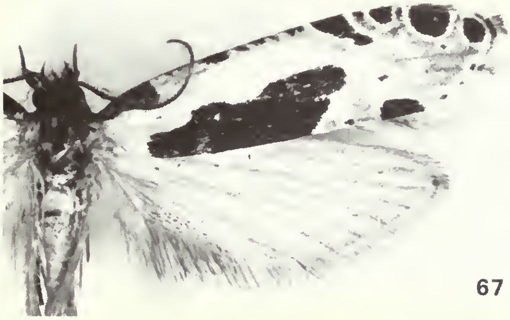
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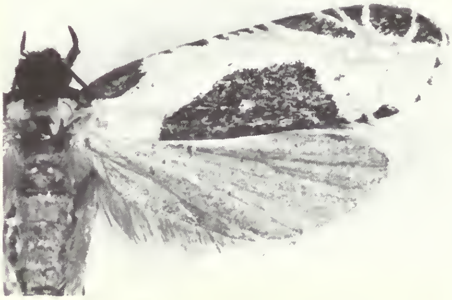
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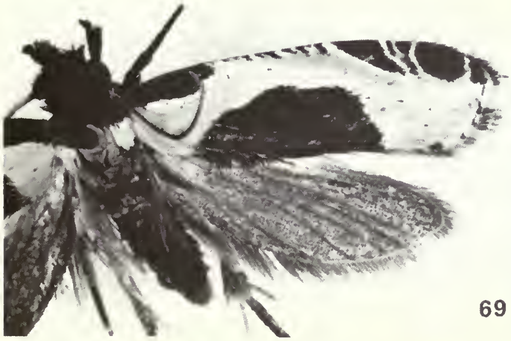
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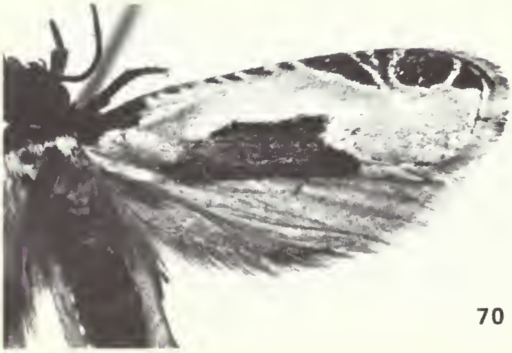
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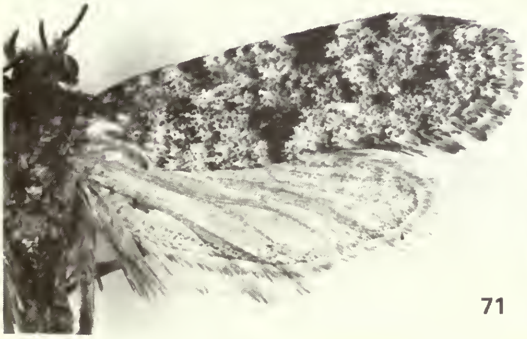
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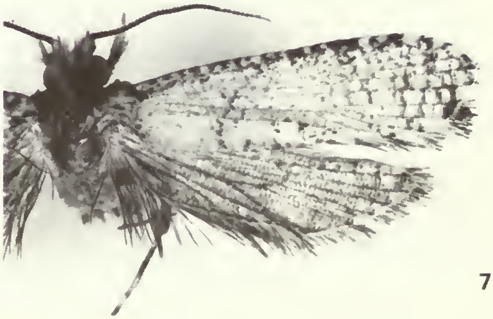
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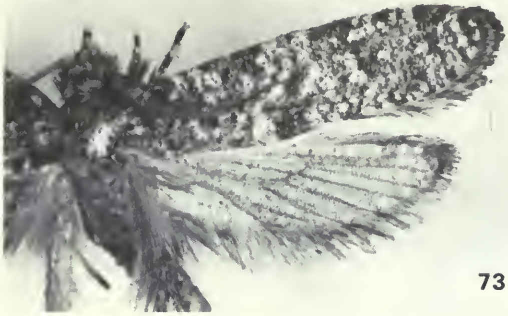
Figs 65–72 65, 66, *Diataga* species. 65, *mercennaria*, ♂ holotype; 66, *direpta*, ♀ paratype. 67–72, *Morophaga* species. 67, *cremnarcha*, ♂ lectotype; 68, *bucephala*, ♀ (Japan); 69, *soror*, ♂ (Sierra Leone); 70, *vadonella*, ♀; 71, *morellus*, ♀ (syntype of *fungicolella*); 72, *borneensis*, ♂ holotype.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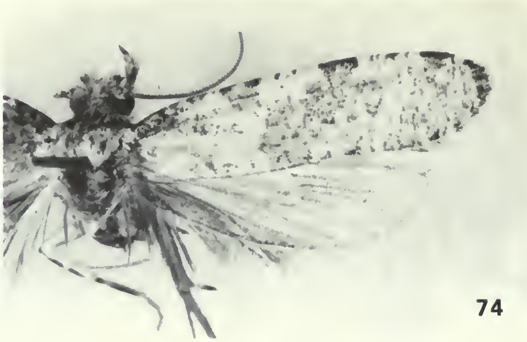
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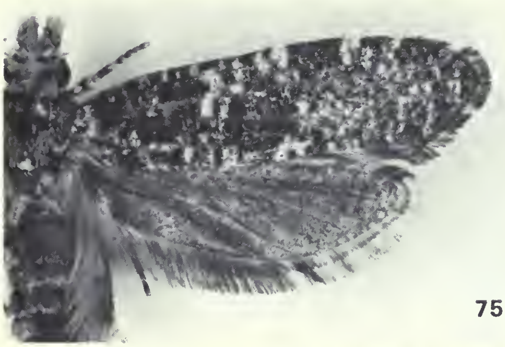
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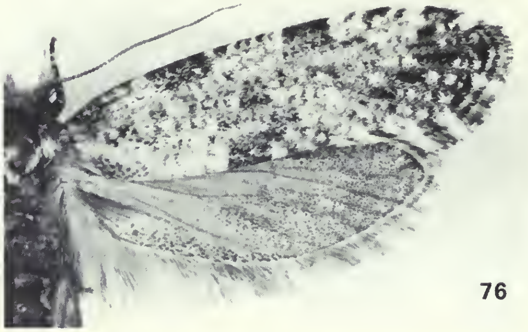
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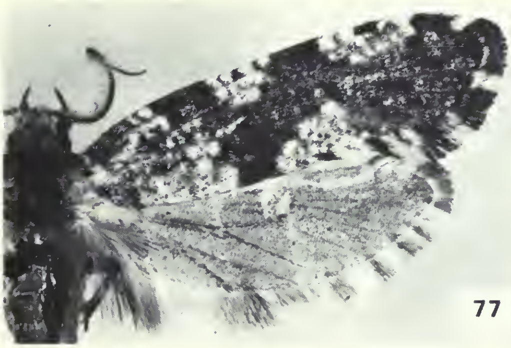
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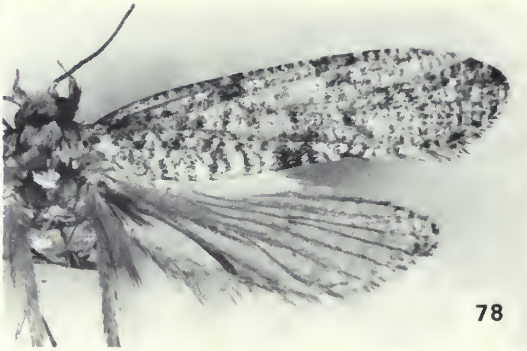
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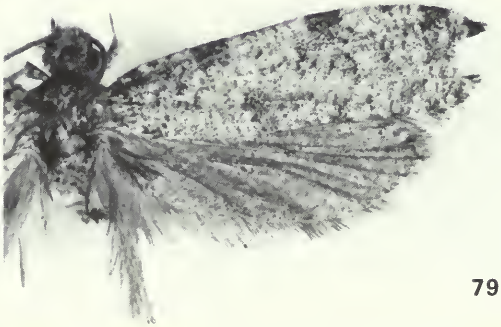
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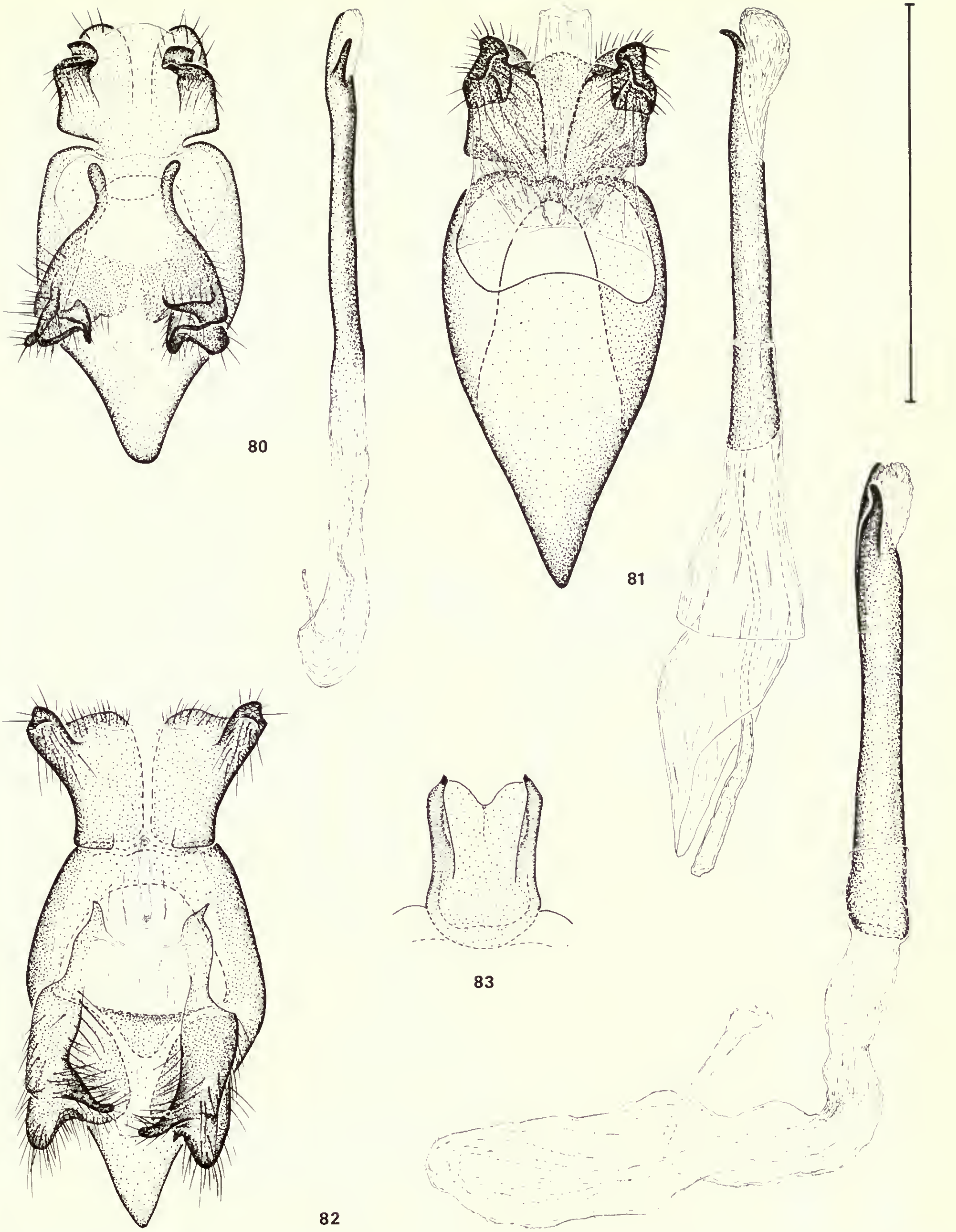
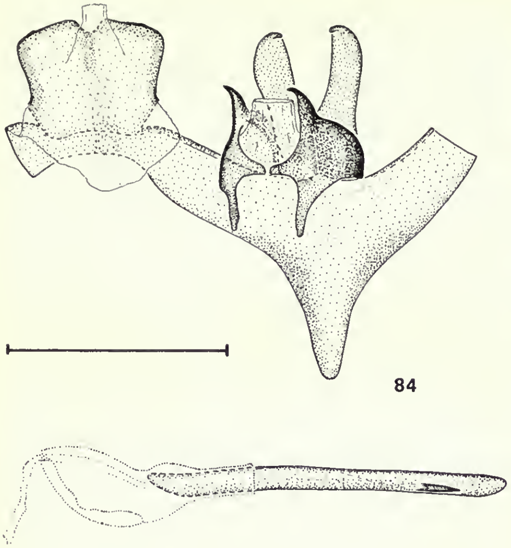
Figs 73–79 *Morophaga* species. 73, *sistrata*, ♂ lectotype; 74, *formosana*, ♂ holotype; 75, *clonodes*, ♀; 76, *choragella*, ♀; 77, *hyrcanella*, ♂; 78, *fasciculata*, ♂ holotype; 79, *kobella*, ♀ holotype.



Figs 80–83 Male genitalia of *Morophagoides* species. 80, *ussuriensis*; 81, *moriutii*, paratype (Japan); 82, *moriutii* (Taiwan); 83, *berkeleyella* – uncus. Scale line = 1 mm.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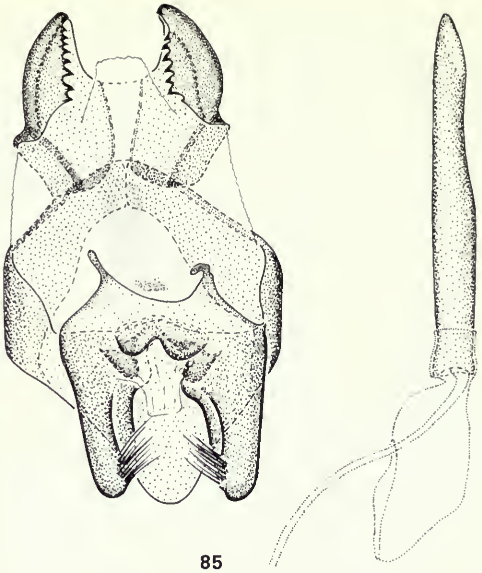
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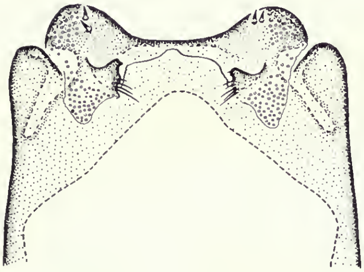
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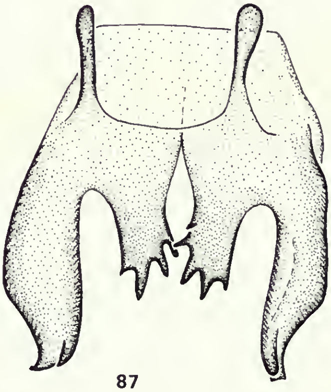
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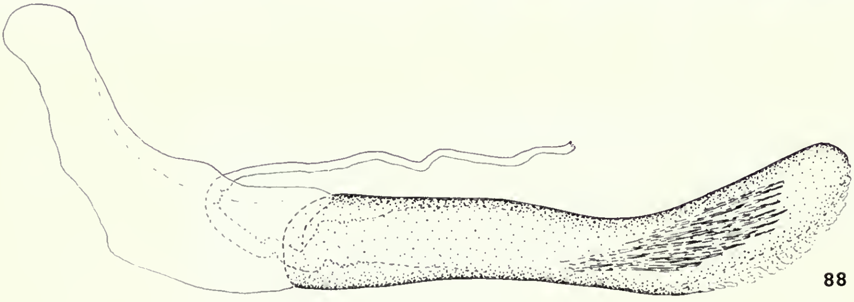
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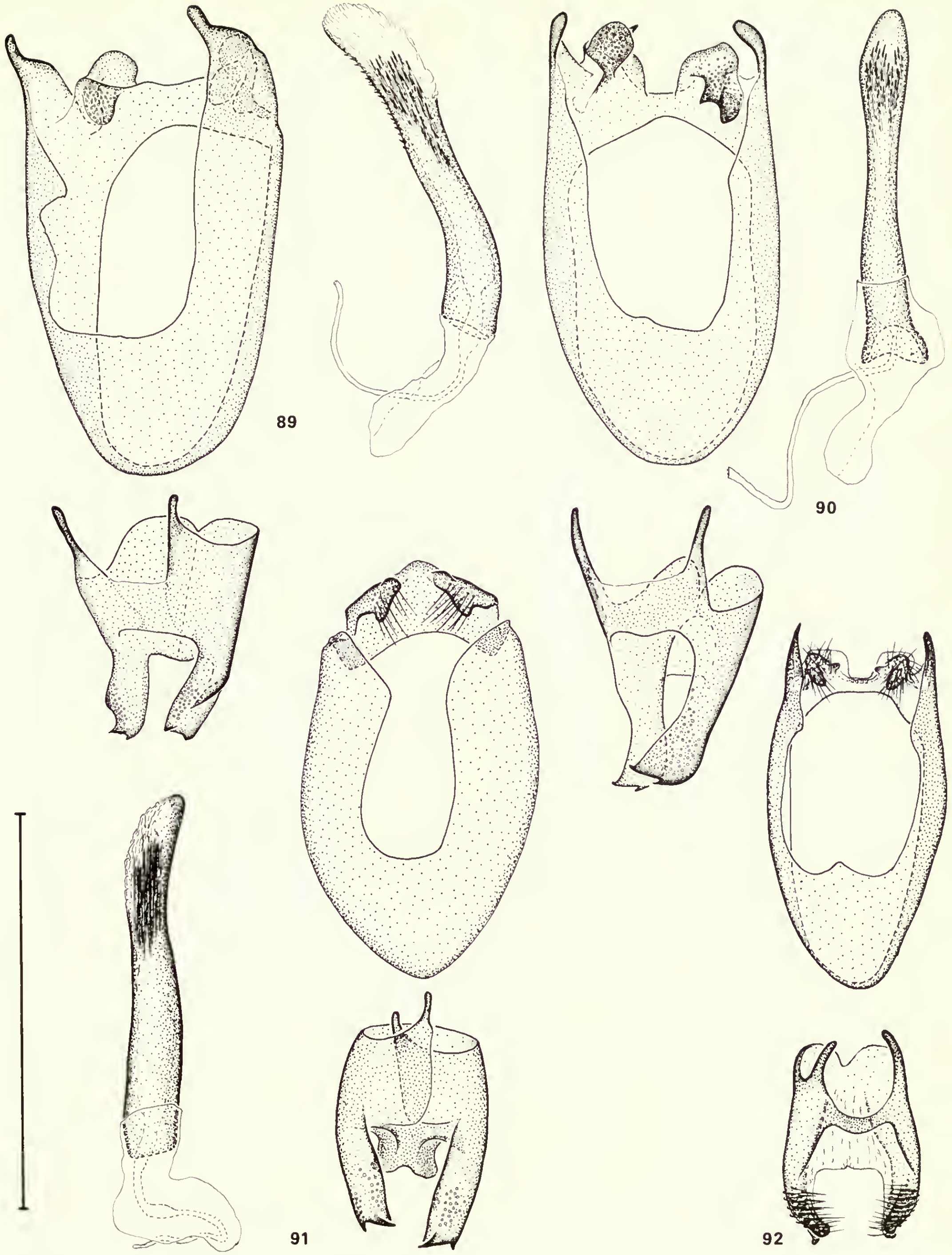
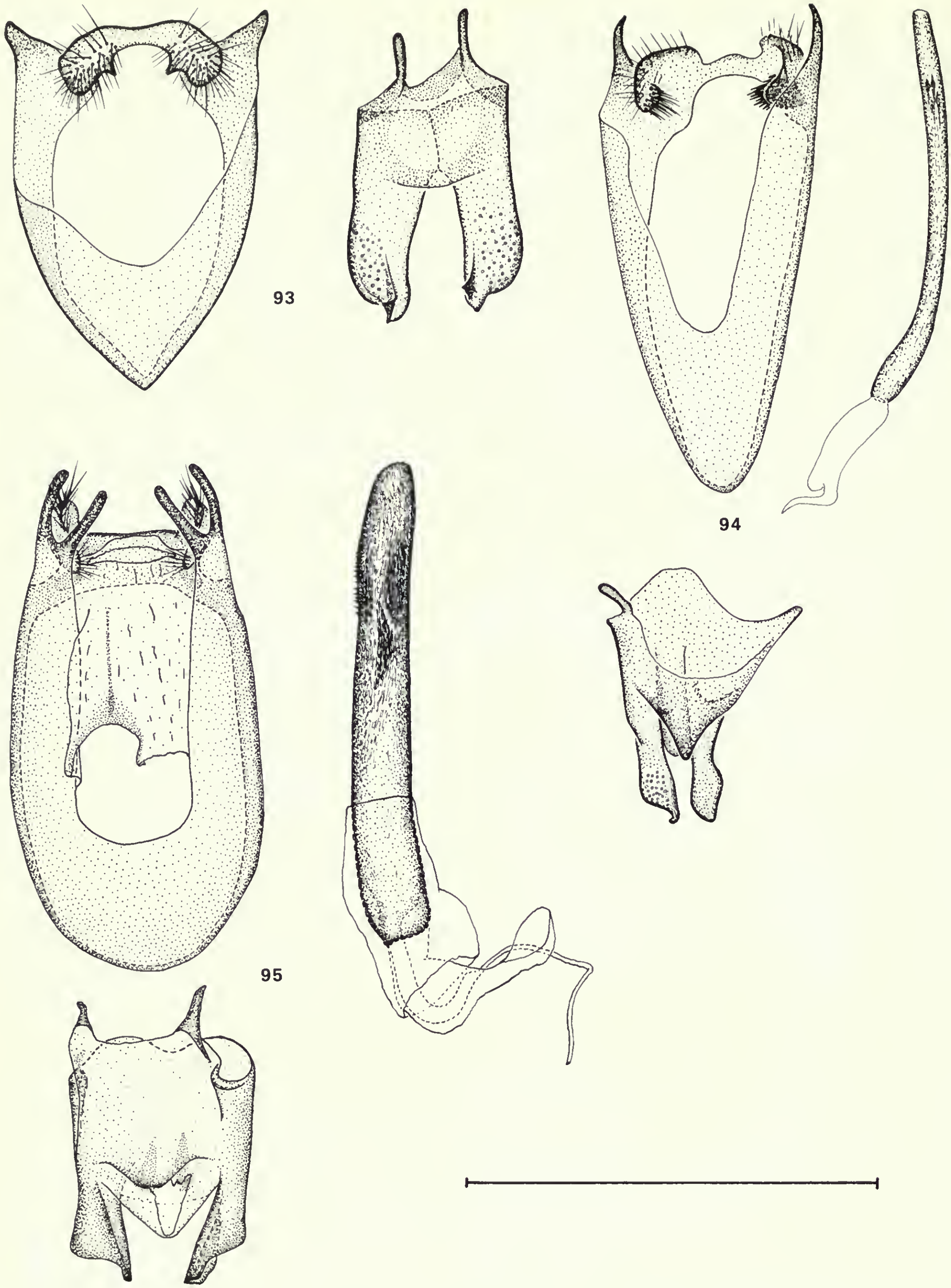
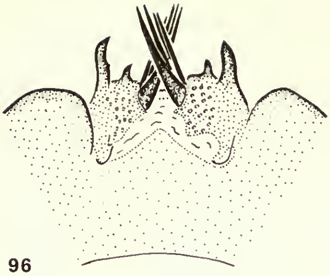
Figs 84–88 Male genitalia. 84, 85, *Morophagoides* species. 84, *burkerella* (note reduced scale); 85, *iulina*, holotype. 86–88, *Daviscardia coloradella*. 86, uncus and tegumen; 87, valvae; 88, aedeagus. Scale line = 1 mm.



Figs 89–92 Male genitalia of *Daviscardia* species (fused valvae detached). 89, *luctuosa,* lectotype; 90, *bimendella*, lectotype; 91, *radulella,* holotype; 92, *beckeri,* holotype. Scale line = 1 mm.



Figs 93–95 Male genitalia of *Daviscardia* species (fused valvae detached). 93, *mackiei*, paratype; 94, *bicolorella*, holotype; 95, unnamed species (Mexico). Scale line = 1 mm.



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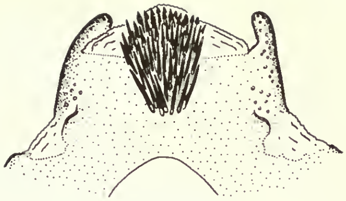

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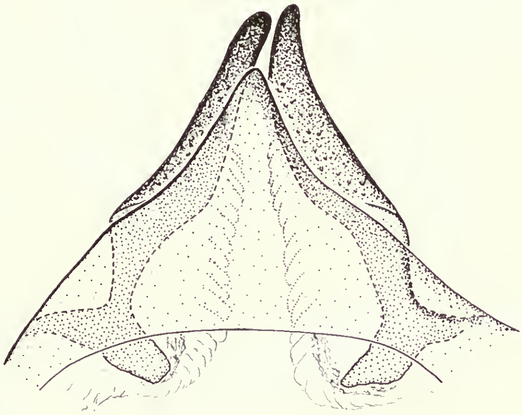

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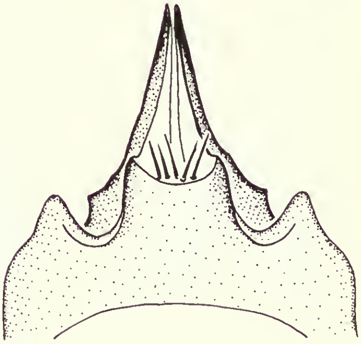

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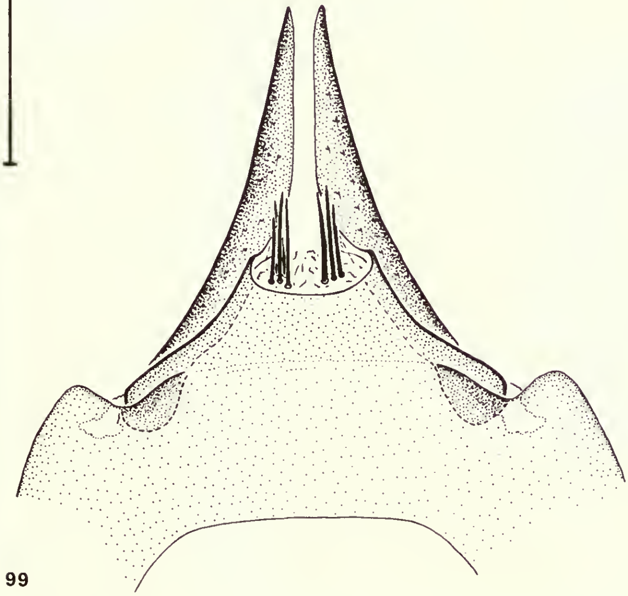

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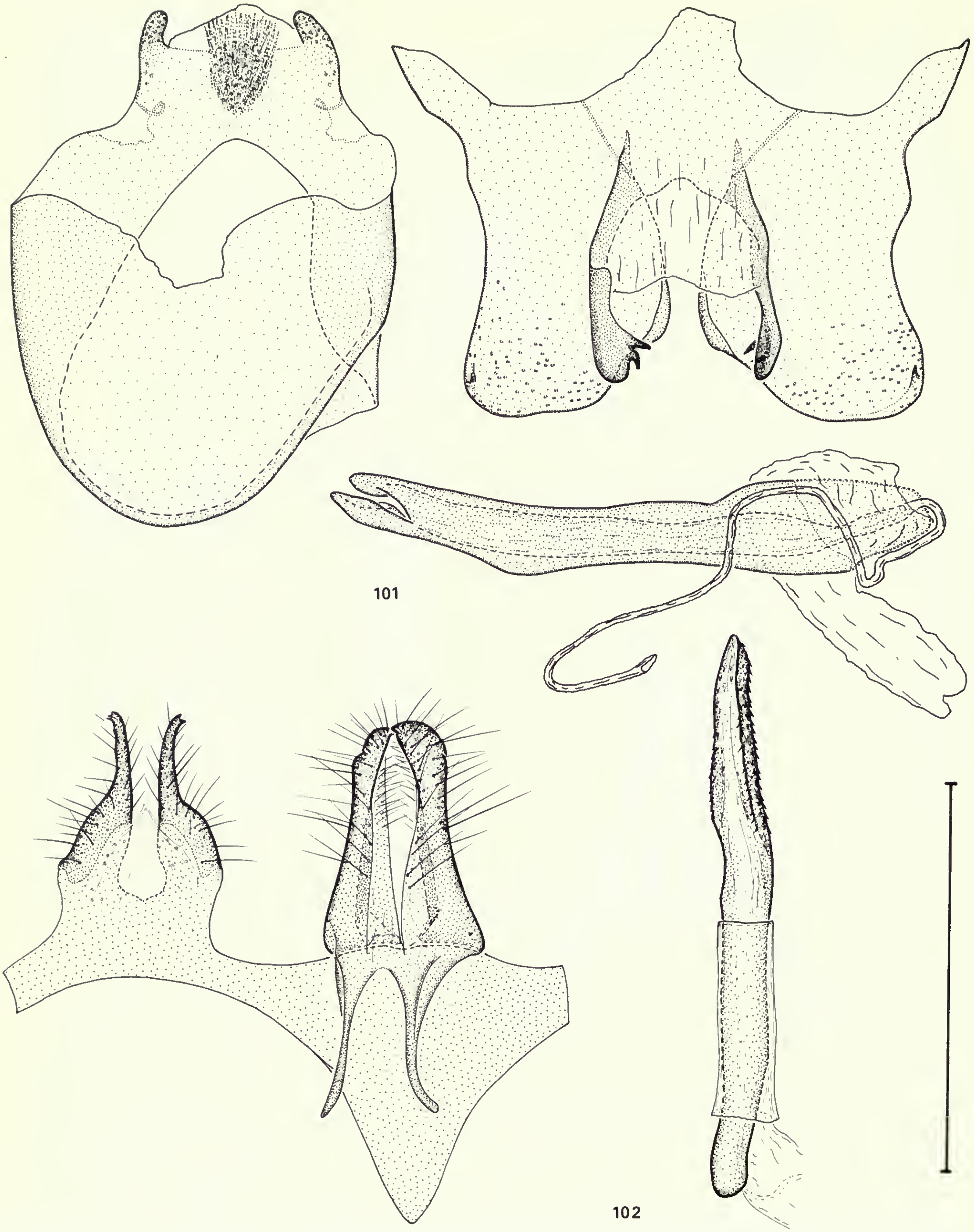
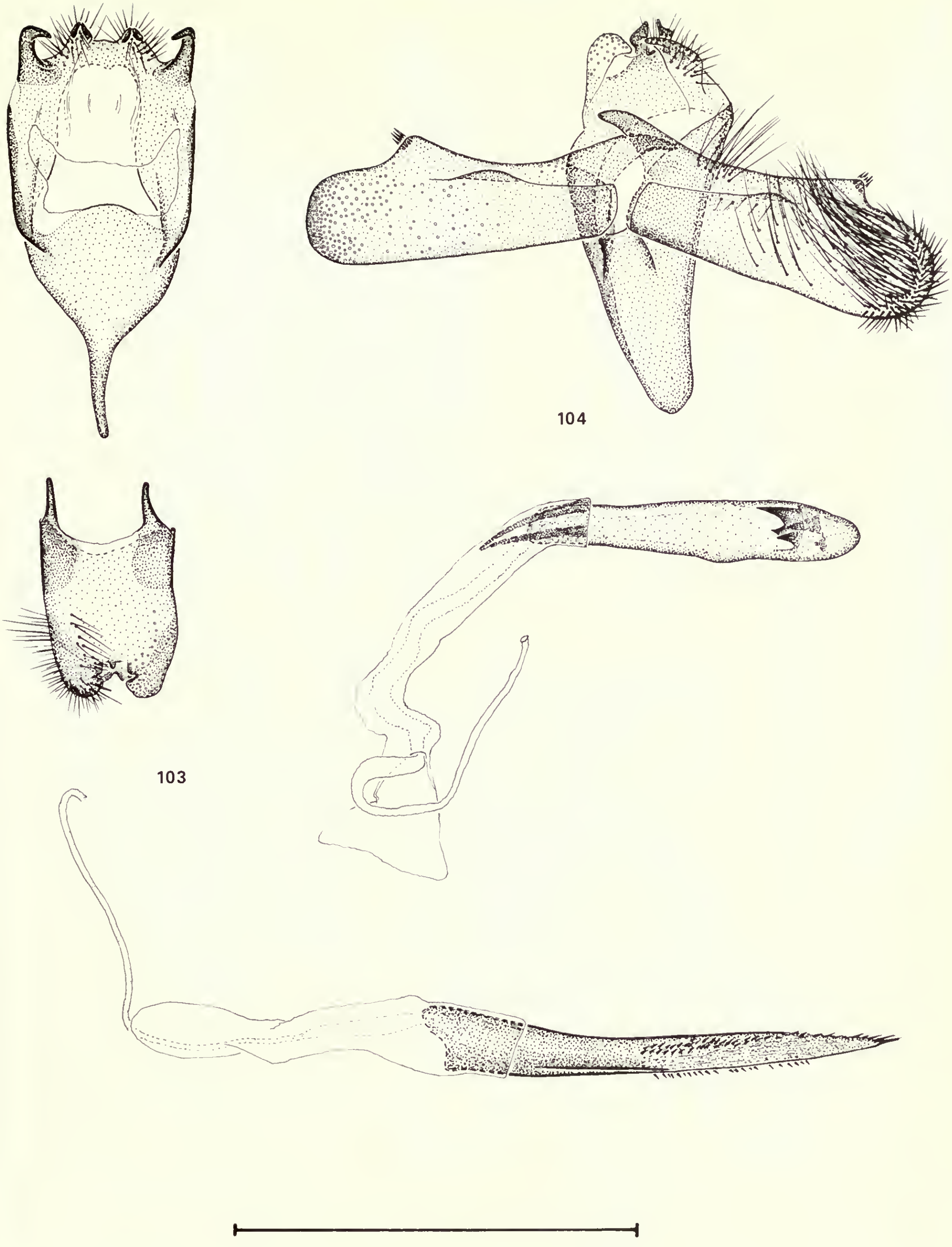
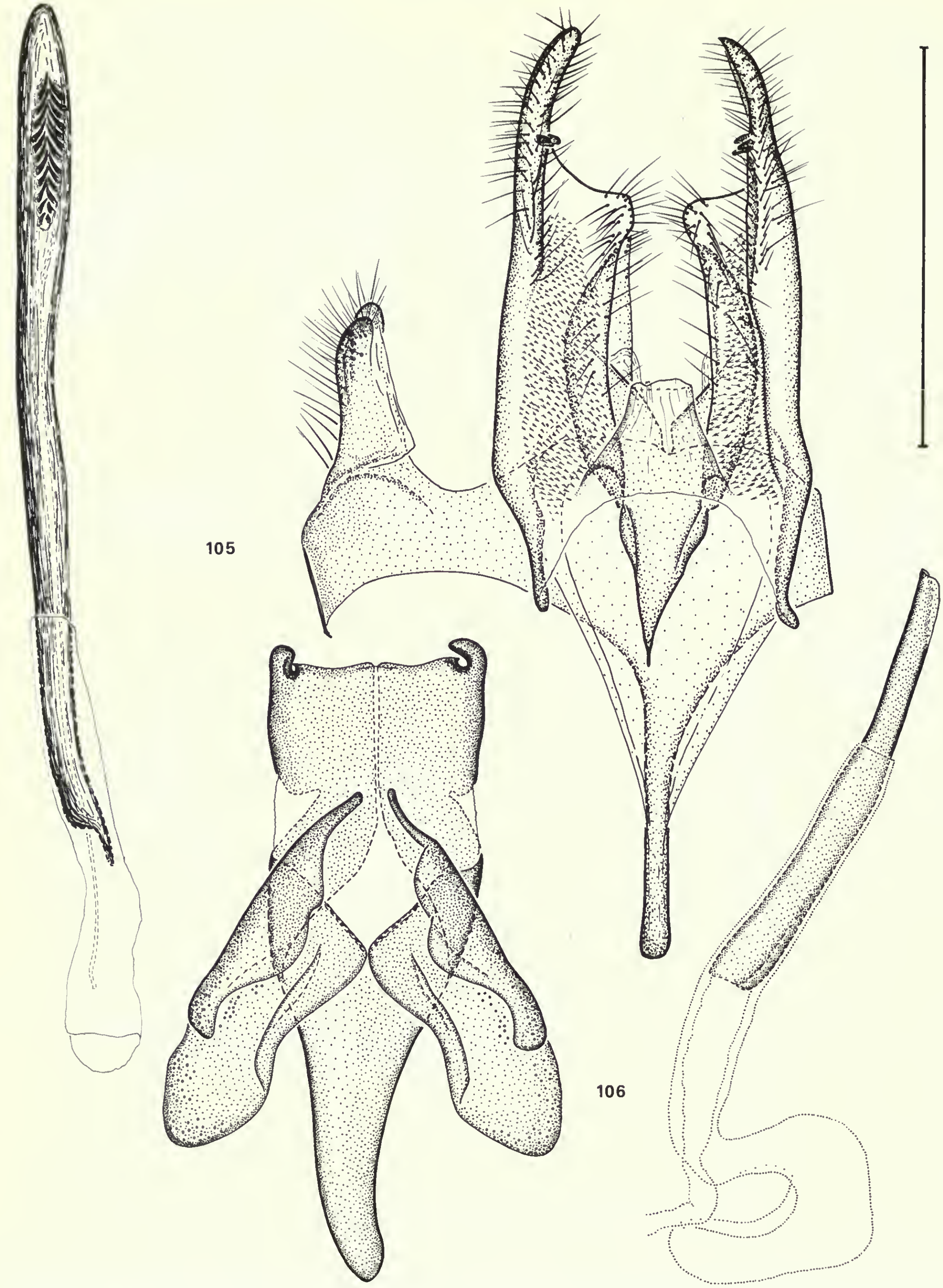
Figs 96–100 Male genitalia – dorsal view of uncus lobes and tegumen of *Scardia* species. 96, *anatomella*; 97, *assamensis*, holotype; 98, *amurensis*; 99, *boletella*; 100, *caucasica* (after Zagulajev, 1973). Scale line = 1 mm.



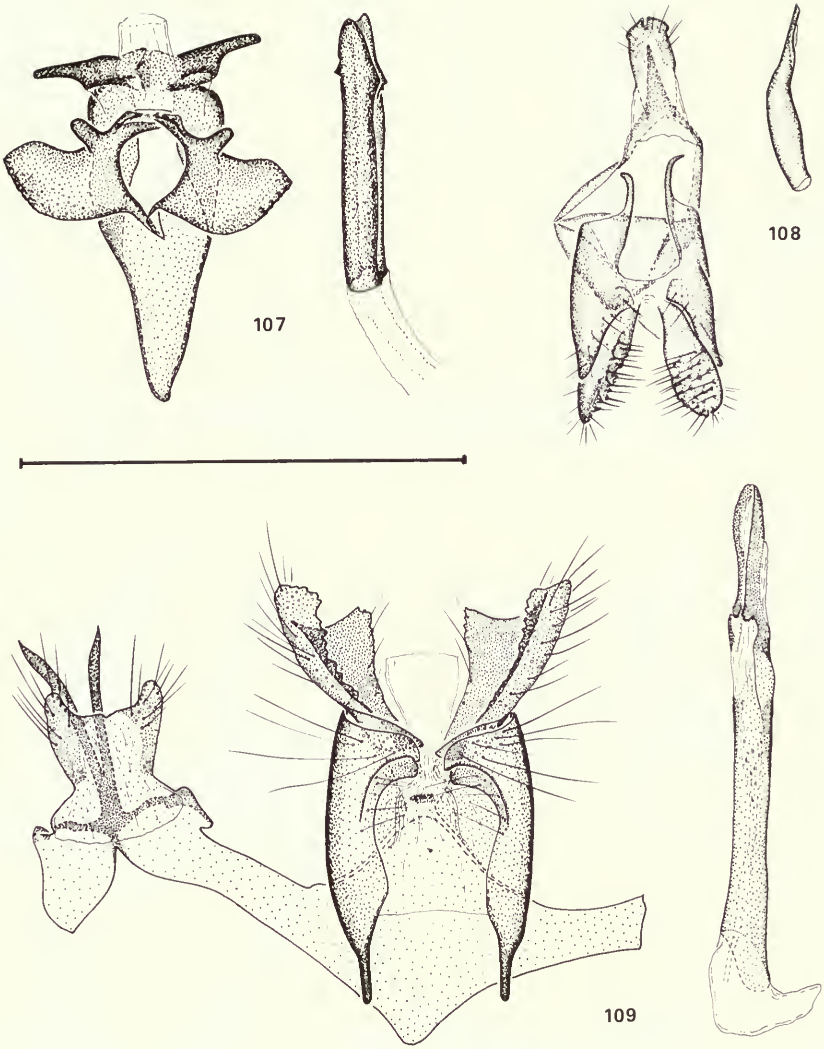
Figs 101, 102 Male genitalia. 101, *Scardia assamensis,* holotype (fused valvae detached); 102, *Perilicmetis diplaca*. Scale line = 1 mm.



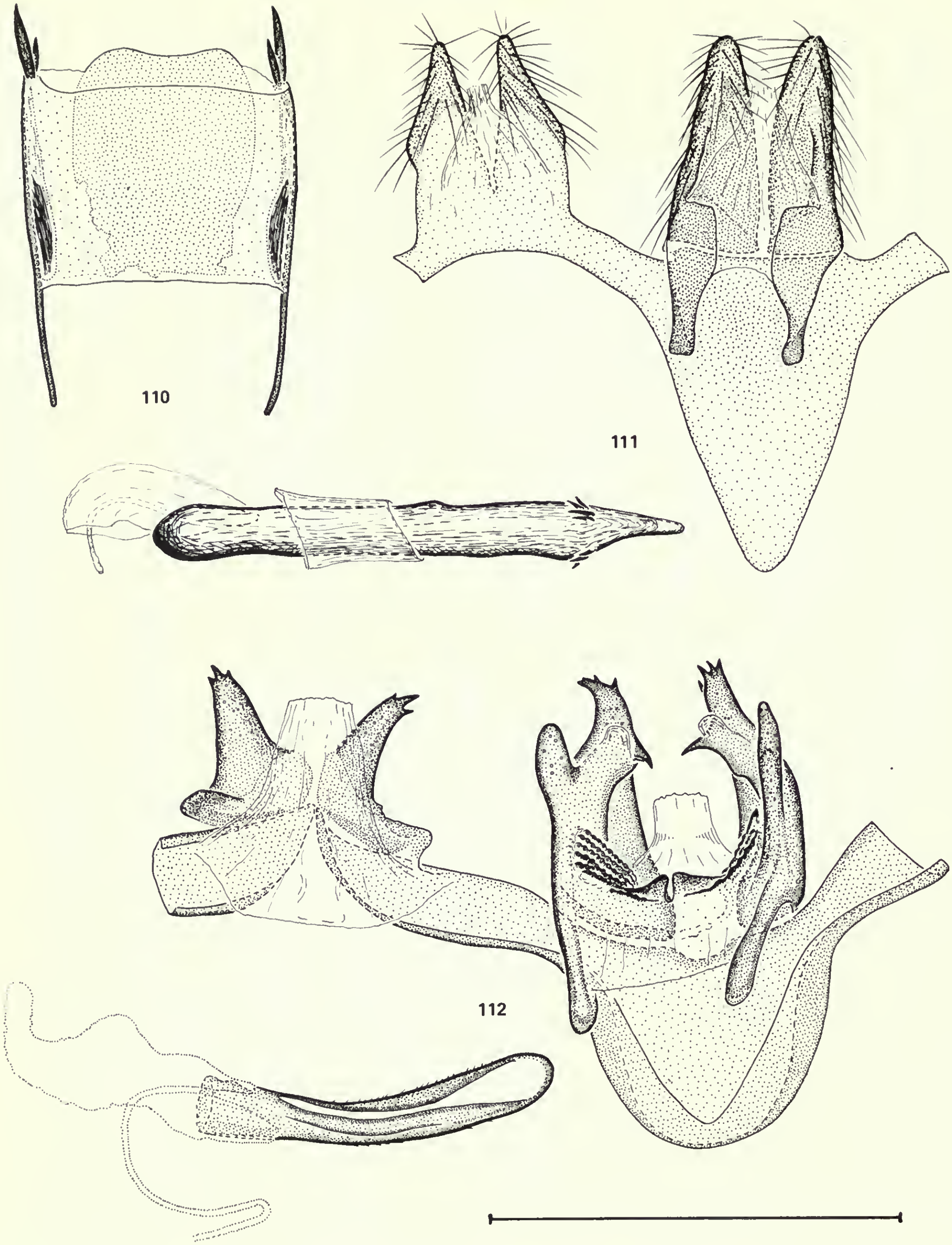
Figs 103, 104 Male genitalia. 103, *Gentingia hollowayi,* holotype (fused valvae detached); 104, *Moscardia varna,* holotype. Scale line = 1 mm.



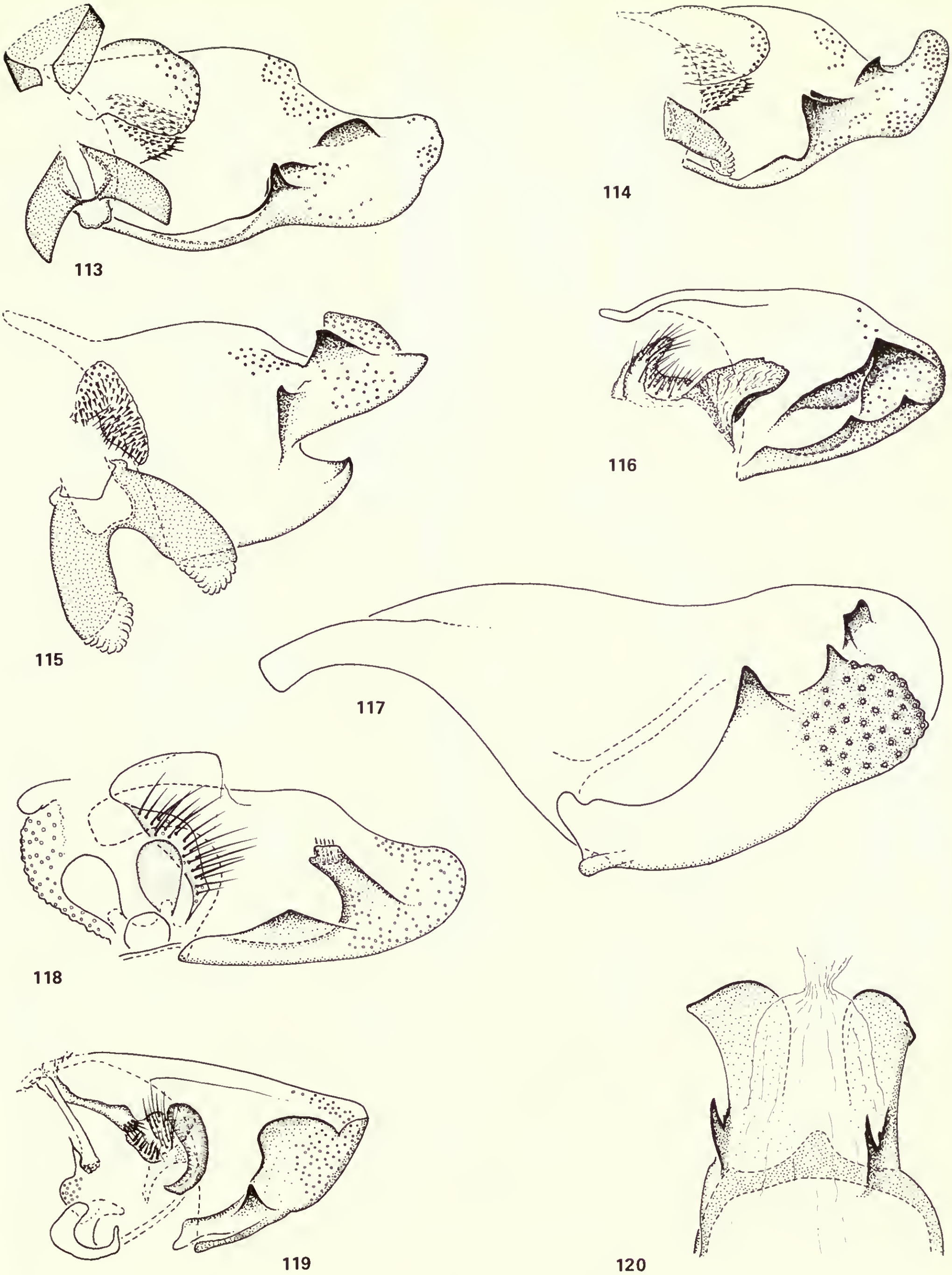
Figs 105, 106 Male genitalia. 105, *Cnismorectis choritica*; 106, *Cranaodes oroya*, holotype. Scale line = 1 mm.



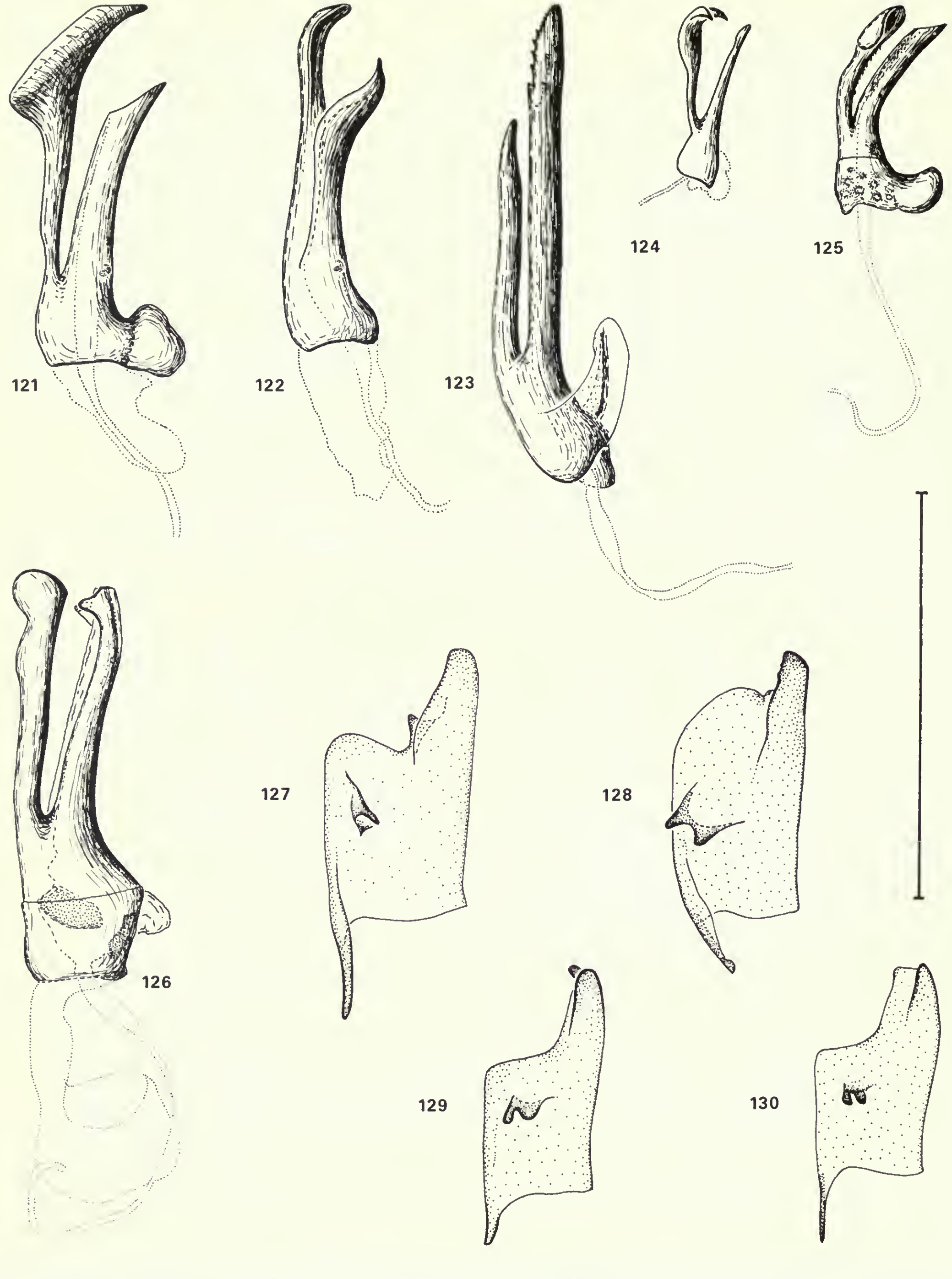
Figs 107–109 Male genitalia. 107, *Scardiella approximatella.* 108, 109, *Necroscardia* species. 108, *funeratella,* lectotype; 109, *morticina,* holotype. Scale line = 1 mm.



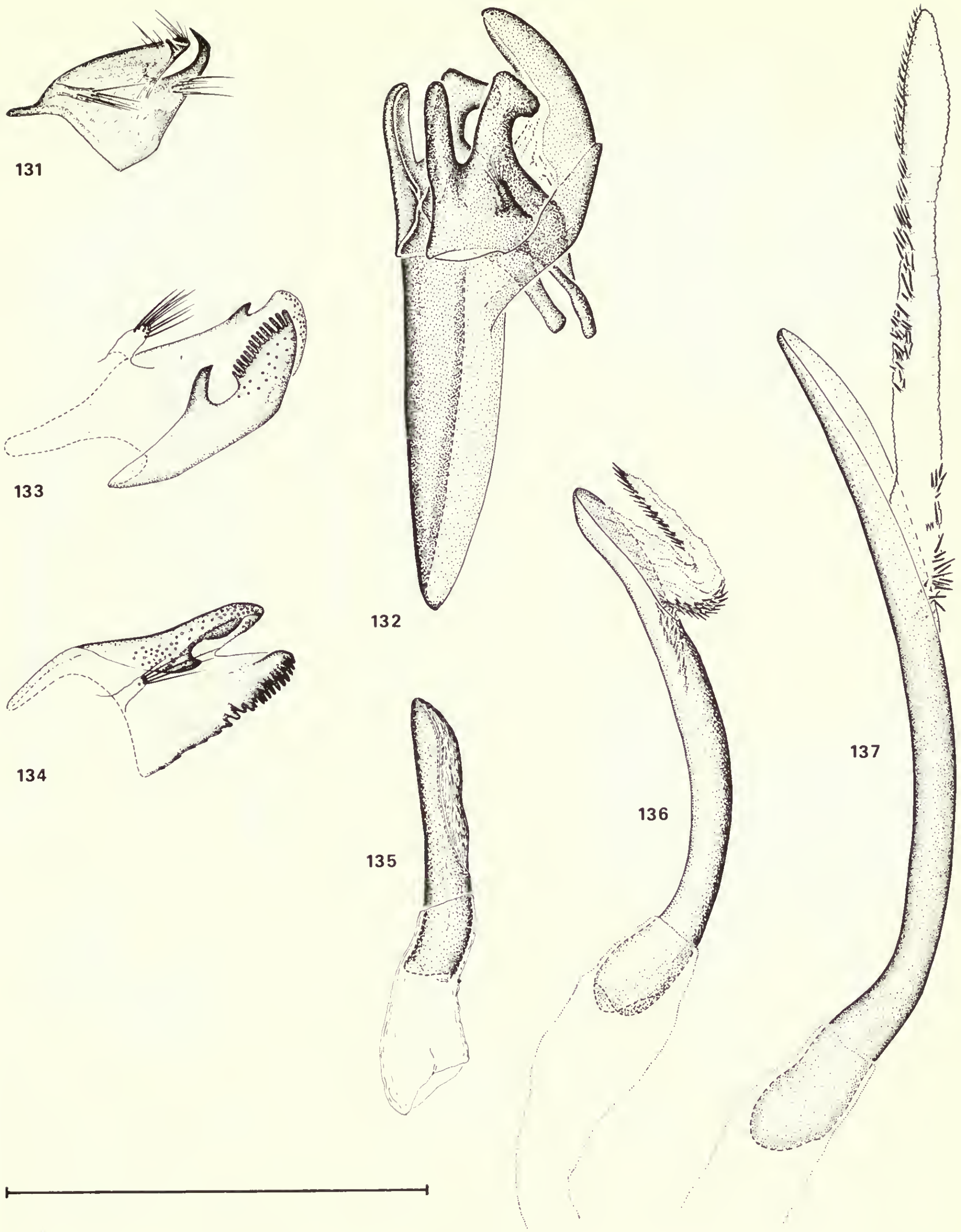
Figs 110–112 Male genitalia. 110, *Necroscardia funeratella,* lectotype – modified eighth abdominal segment; 111, *Miniscardia minimella* (Costa Rica); 112, *Amorophaga japonica,* holotype. Scale line = 1 mm.



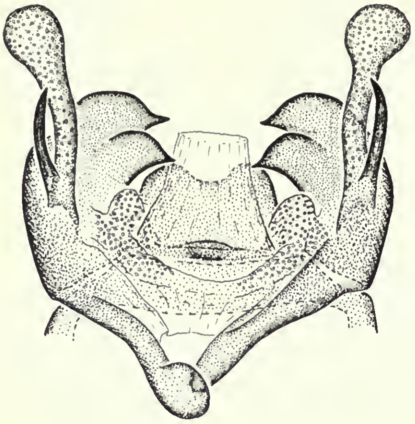
Figs 113–120 Male genitalia of *Diataga* species (113–119, right valva with juxta-transtilla complex; 120, ventral view of uncus lobes). 113, *leptosceles,* lectotype; 114, *leptosceles* (Brazil); 115, *frustraminis,* holotype; 116, *brasiliensis,* holotype; 117, *compsacma,* lectotype (juxta-transtilla region destroyed); 118, *levidensis,* holotype; 119, 120, *mercennaria*, holotype. Mixed scales, 117 greatly enlarged.

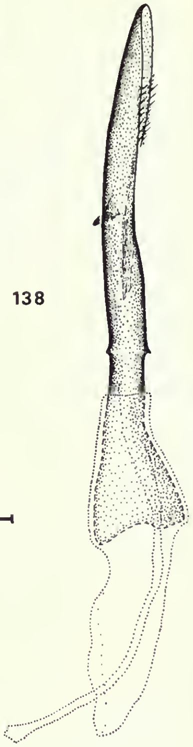


Figs 121–130 Male genitalia (121–126, aedeagus; 127–130, right valva). 121–126, *Diataga* species. 121, *leptosceles*, lectotype; 122, *frustraminis*, holotype; 123, *brasiliensis*, holotype; 124, *compsacma*, lectotype; 125, *levidensis*, holotype; 126, *mercennaria*, holotype. 127–130, *Morophaga* species. 127, *cremnarcha*; 128, *bucephala*; 129, *soror*; 130, *vadonella*, holotype. Scale line = 1 mm.



Figs 131–137 Male genitalia of *Morophaga* species (131, 133, 134 – right valva; 135–137 – aedeagus). 131, *borneensis,* holotype; 132, *sistrata*; 133, *formosana,* holotype; 134, *iriomotensis,* holotype; 135, *borneensis,* holotype; 136, *sistrata*; 137, *formosana,* holotype. Scale line = 1 mm.





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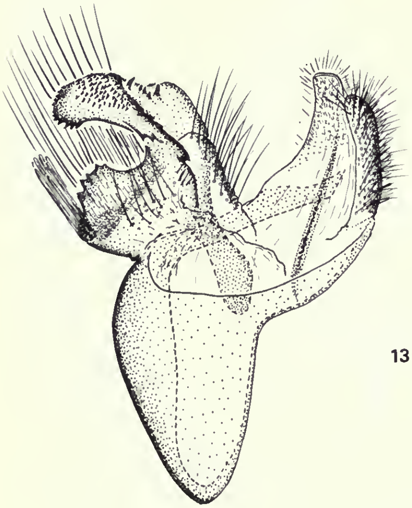

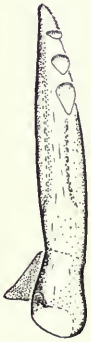

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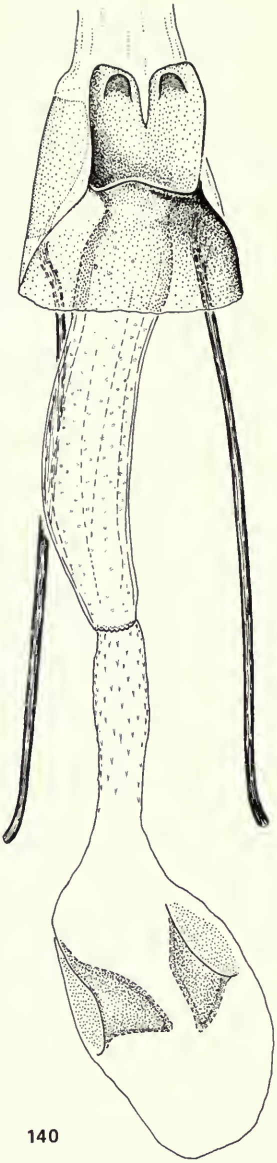

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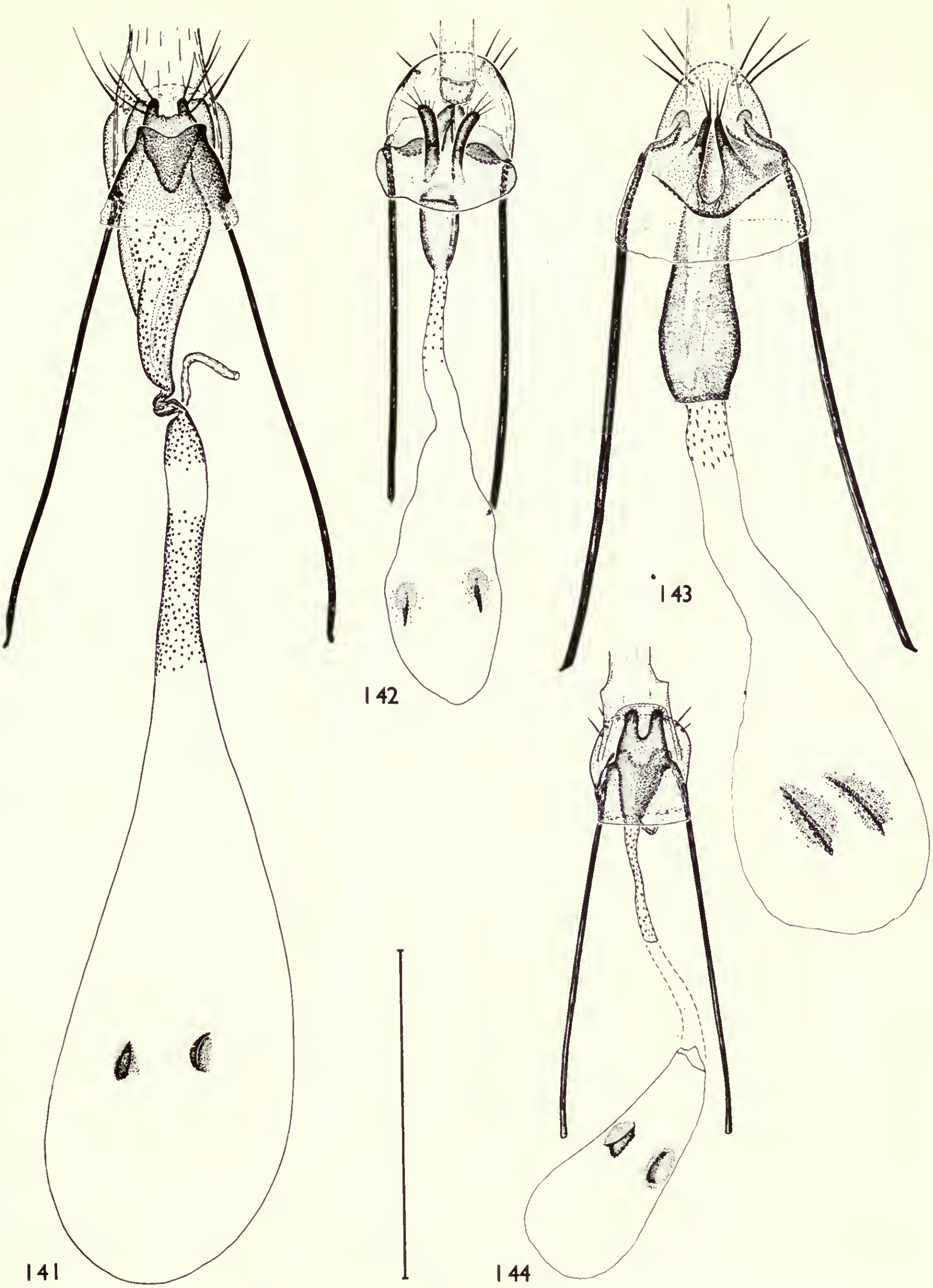
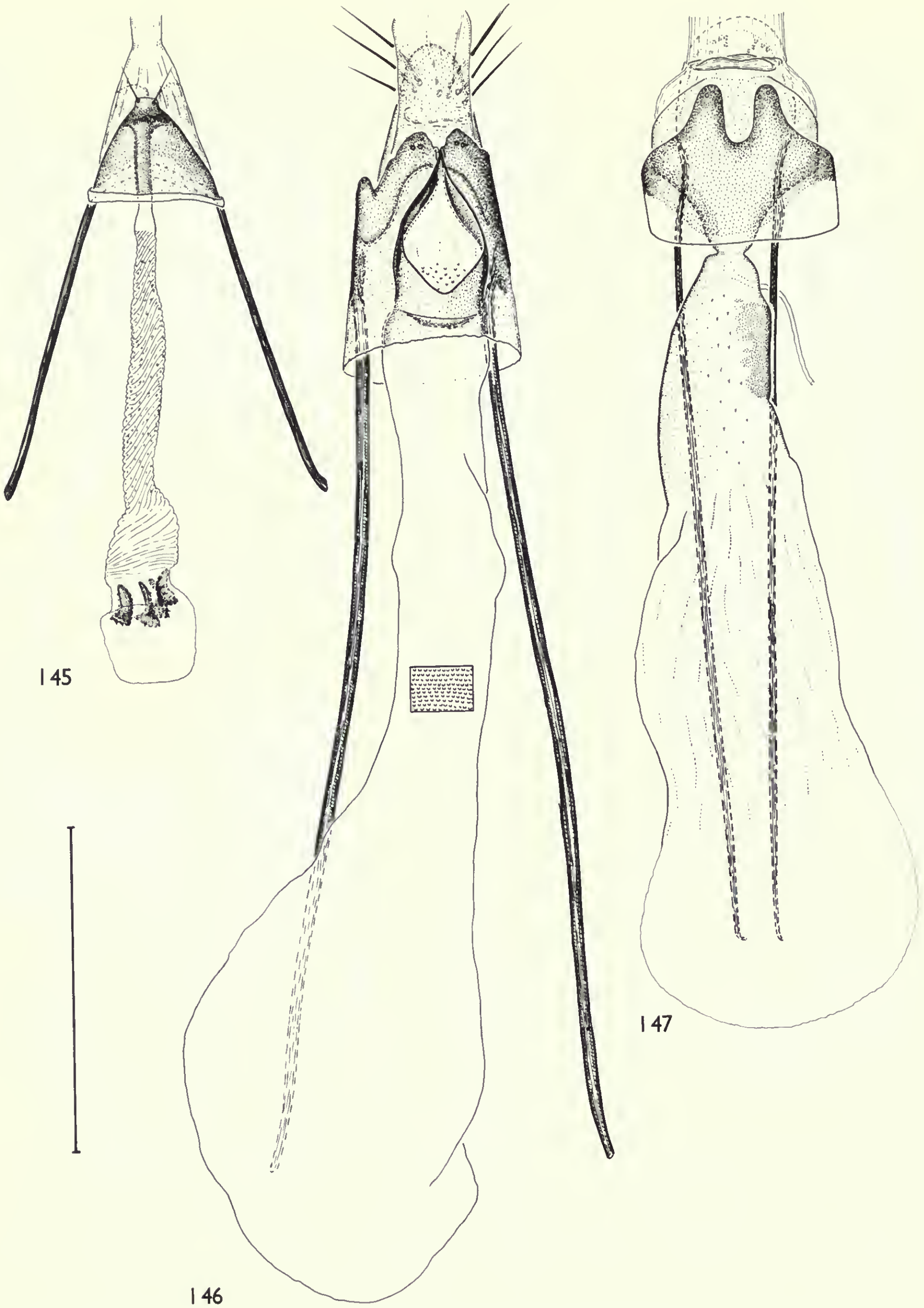
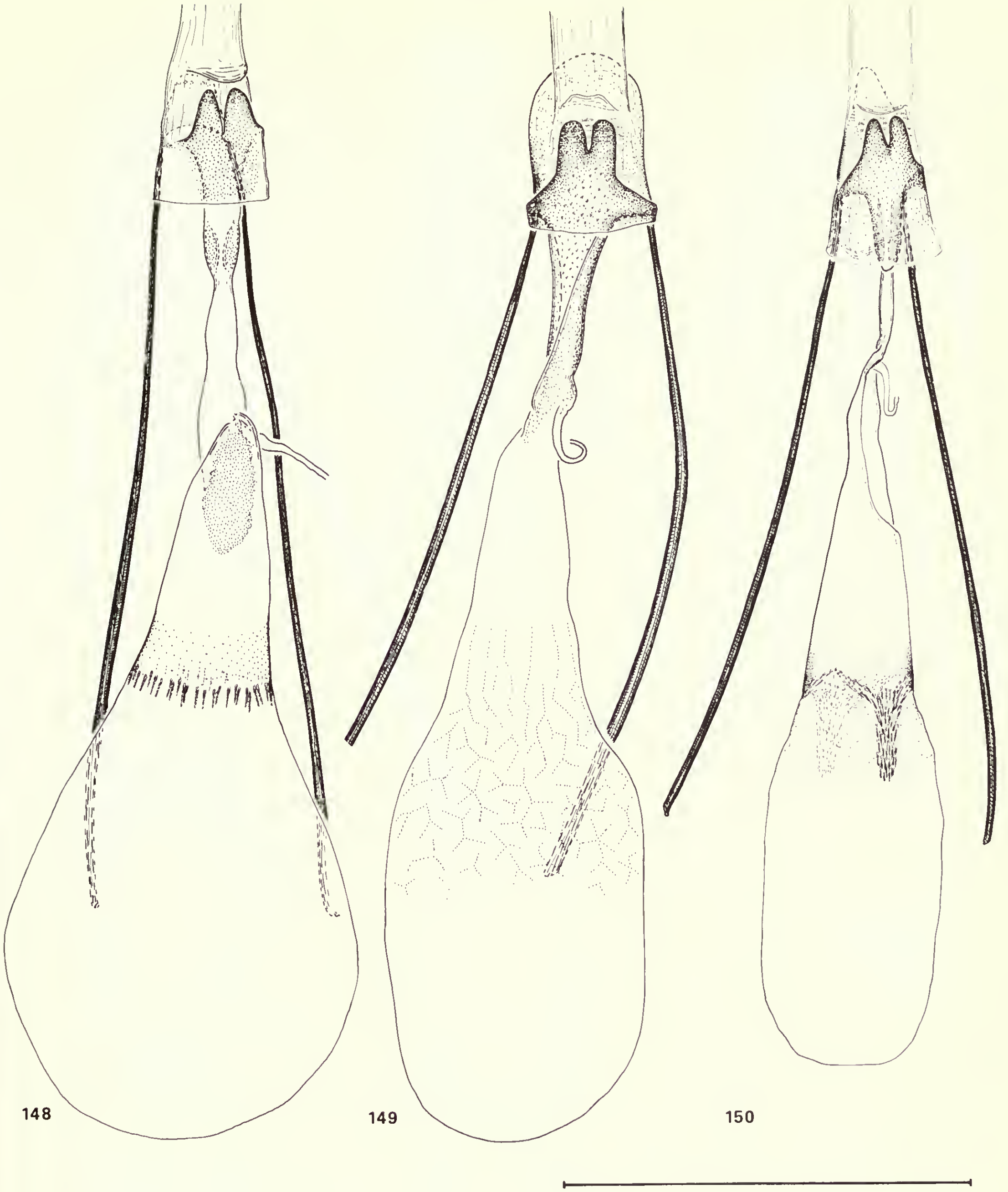
Figs 138–140 138, 139, male genitalia of *Morophaga* species. 138, *clonodes*; 139, *fasciculata*, holotype. 140, female genitalia of *Morophagoides burkerella*. Scale line = 1 mm.



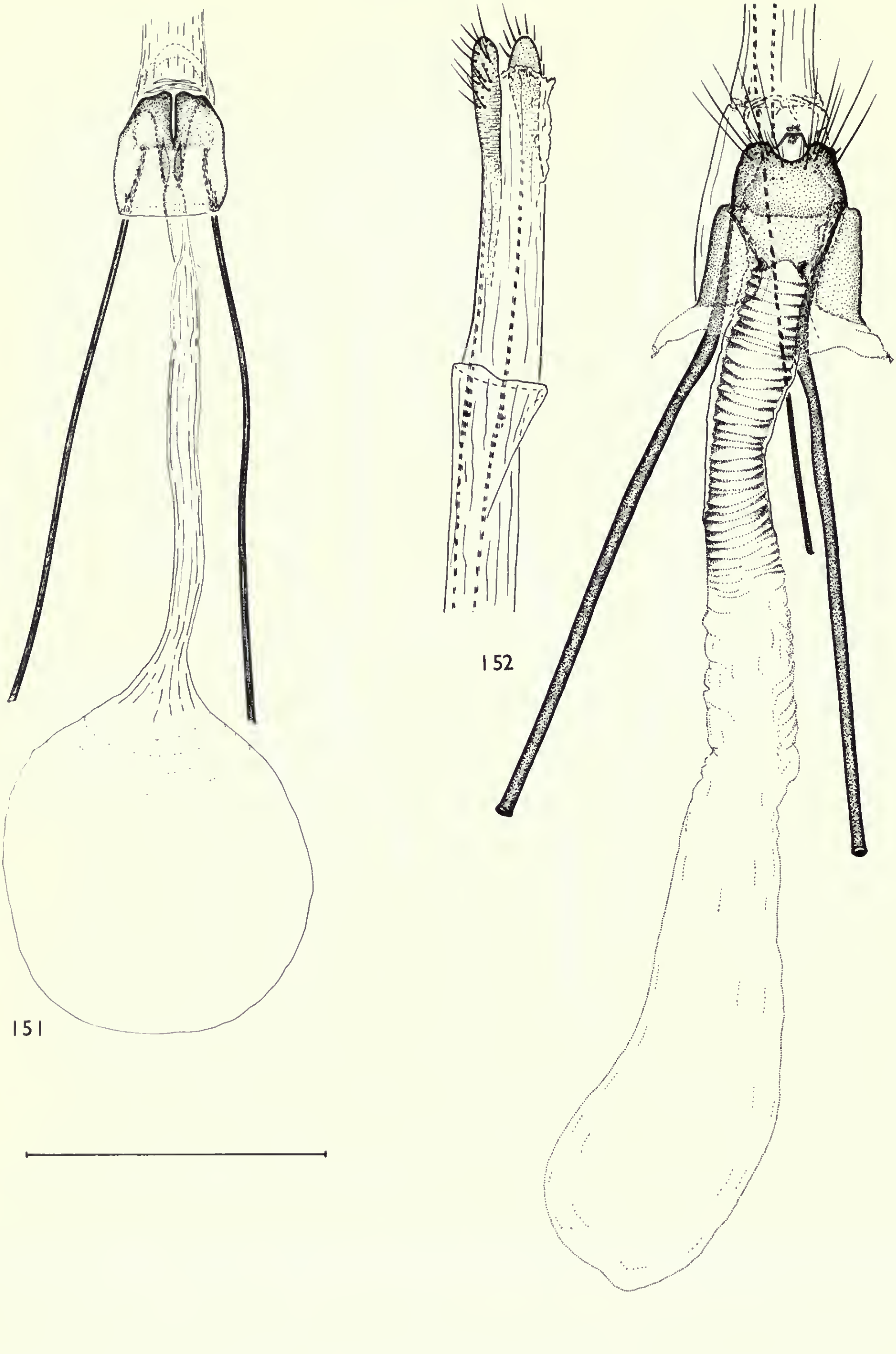
Figs 141–144 Female genitalia of *Morophagoides* species. 141, *moriutii* (Taiwan); 142, *nimbiferum*, holotype; 143, *pythium*, holotype; 144, *montium*, holotype. Scale line = 1 mm.



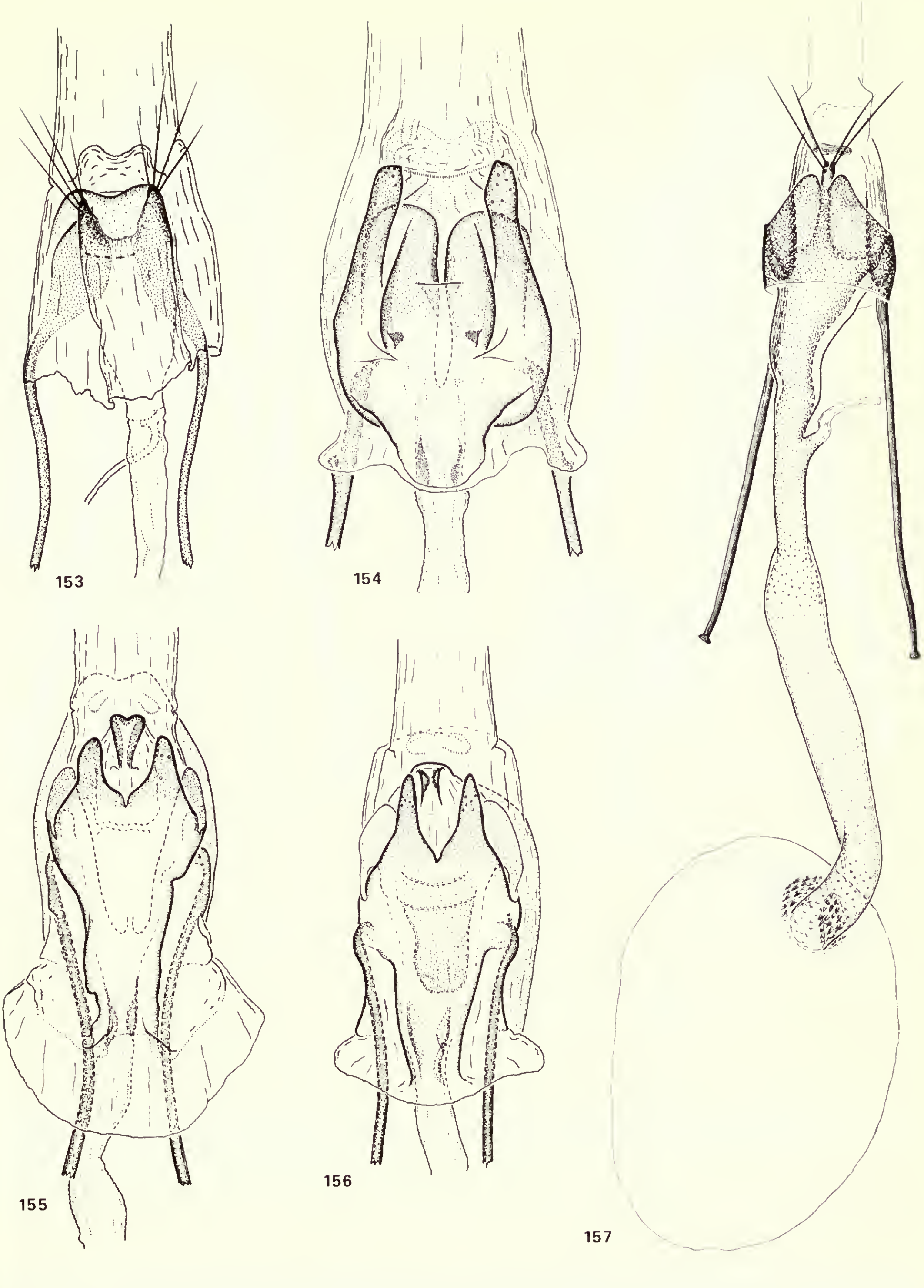
Figs 145–147 Female genitalia. 145, *Bythocrates drosocycla*; 146, *Montescardia fuscofasciella*, lectotype; 147, *Daviscardia coloradella*. Scale line = 1 mm.



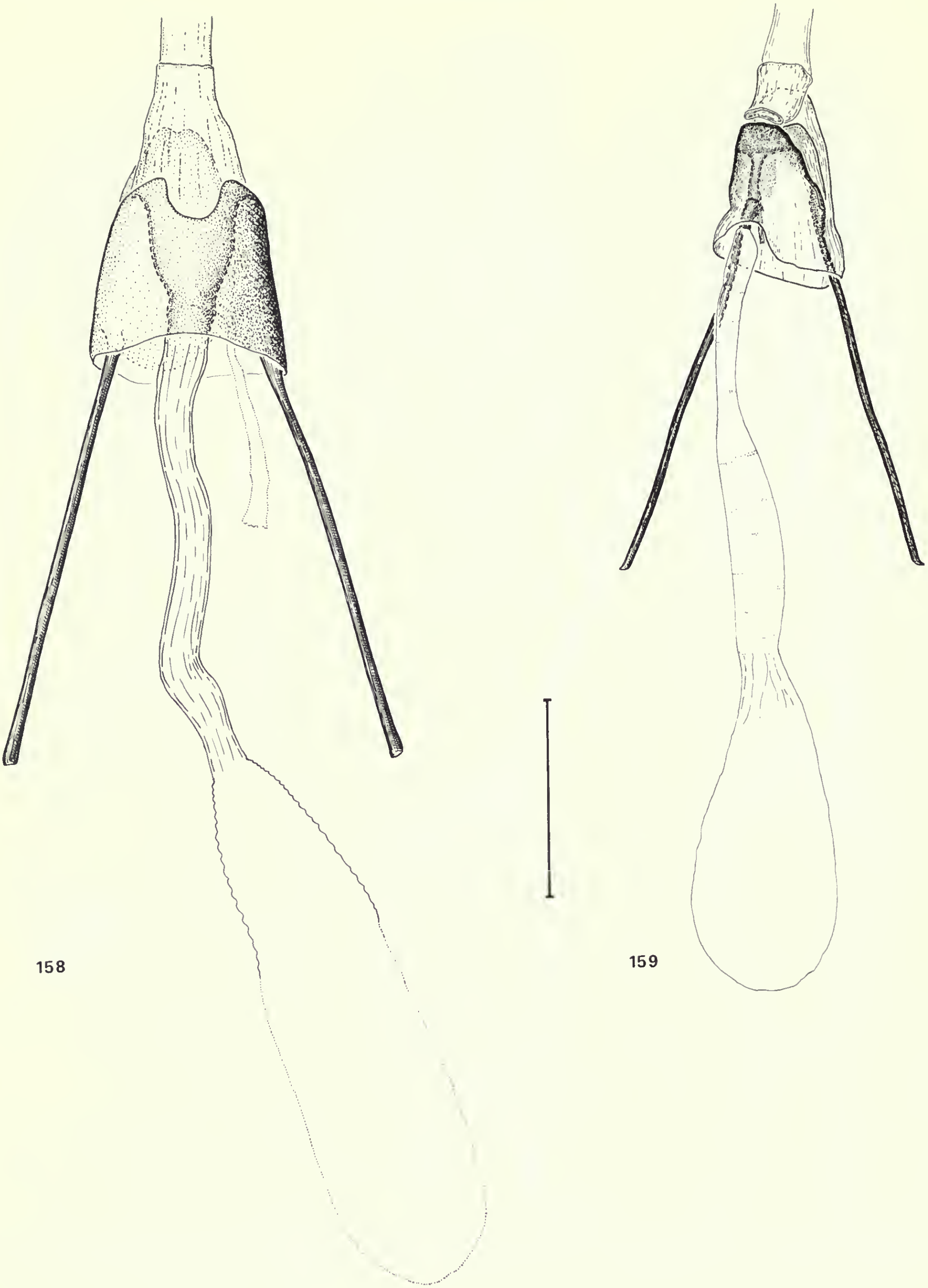
Figs 148–150 Female genitalia of *Daviscardia* species. 148, *beckeri*; 149, *lupulella*, holotype; 150, *mackiei*. Scale line = 1 mm.



Figs 151, 152 Female genitalia. 151, *Daviscardia hypocritella*, holotype; 152, *Scardia alleni*, holotype. Scale line = 1 mm.



Figs 153–157 153–156, female genitalia of *Scardia* species (detail of eighth sternite). 153, *anatomella*; 154, *amurensis*; 155, *boletella*; 156, *caucasica*, paratype. 157, female genitalia of *Gentingia hollowayi*, paratype. Mixed scales.



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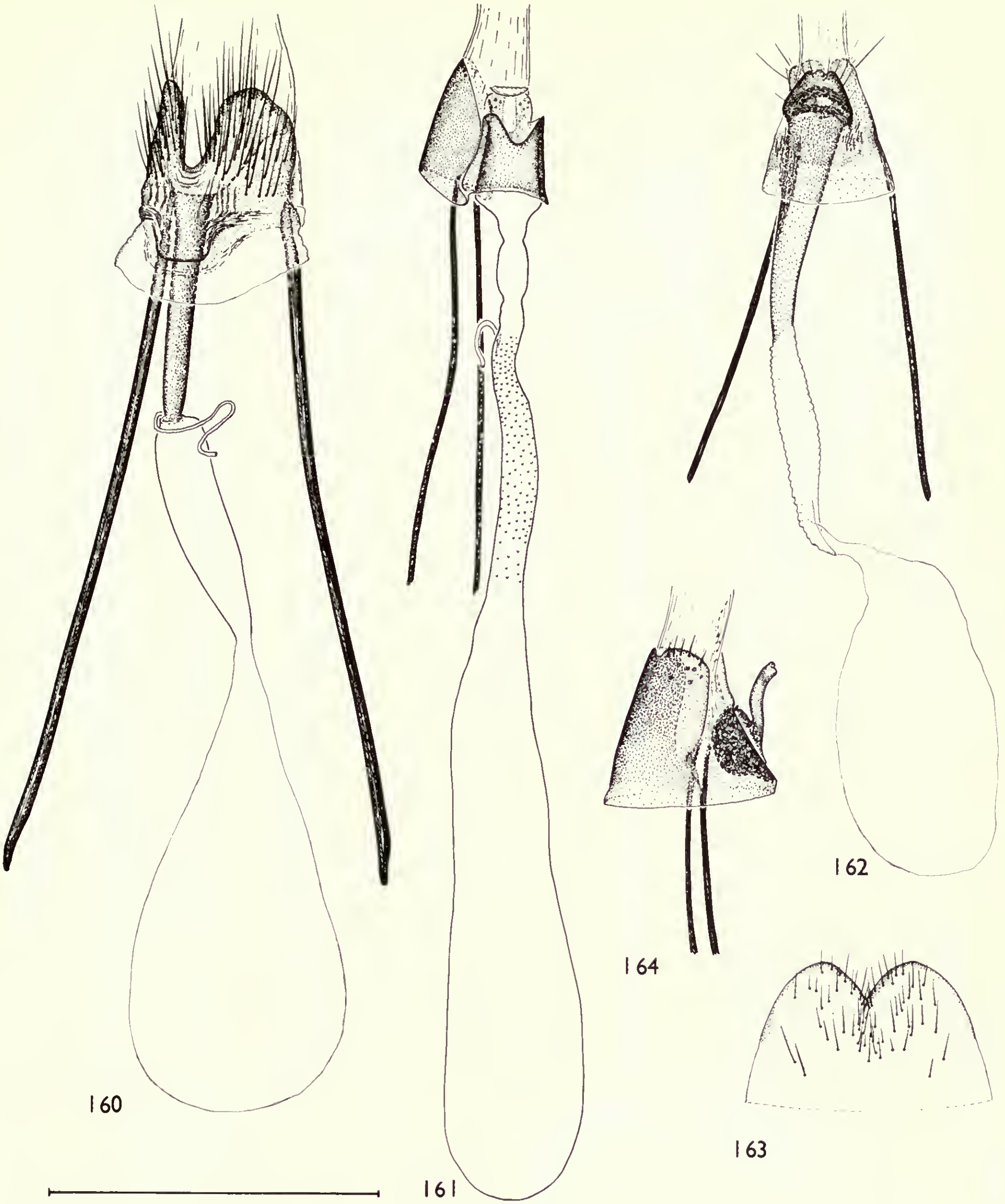
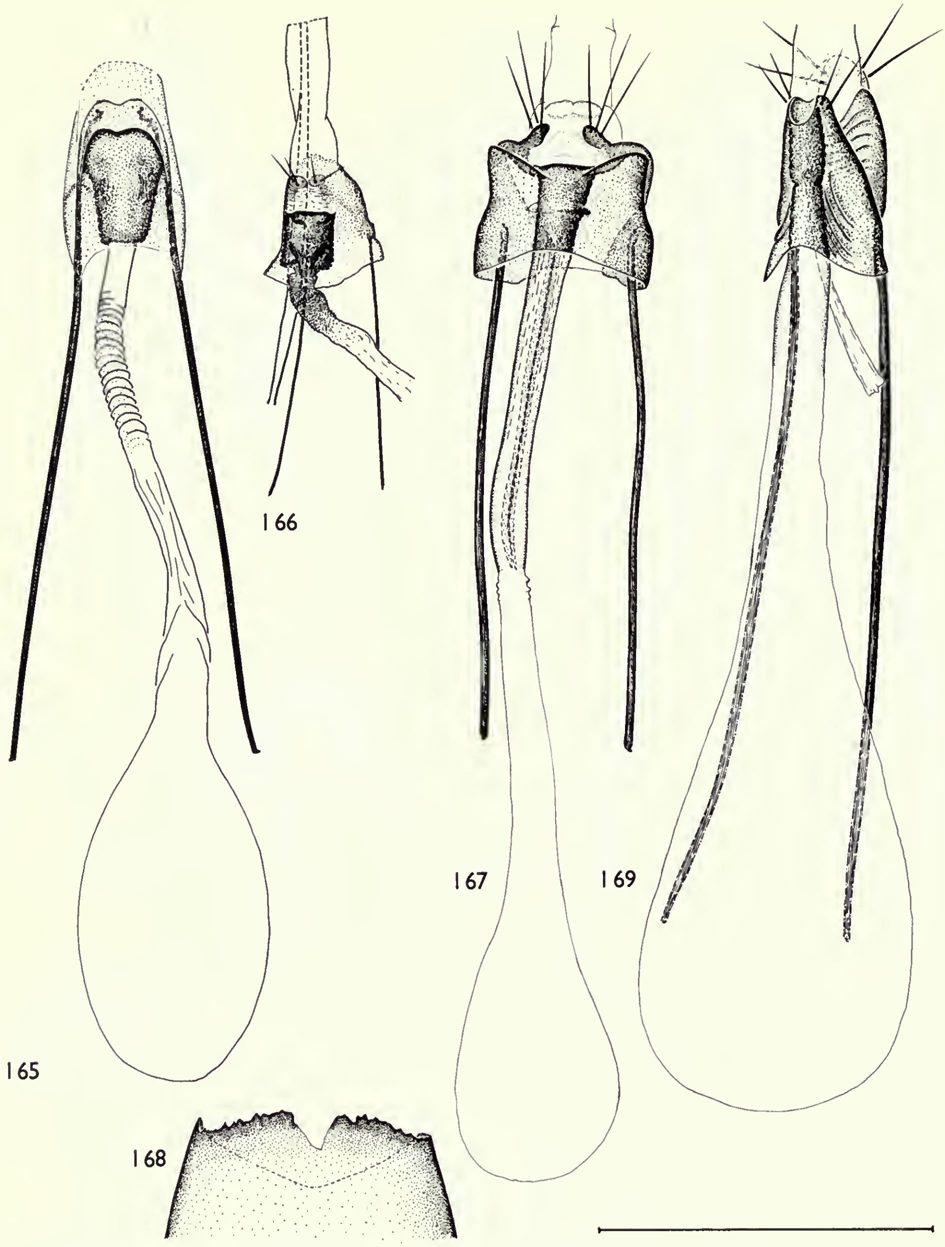
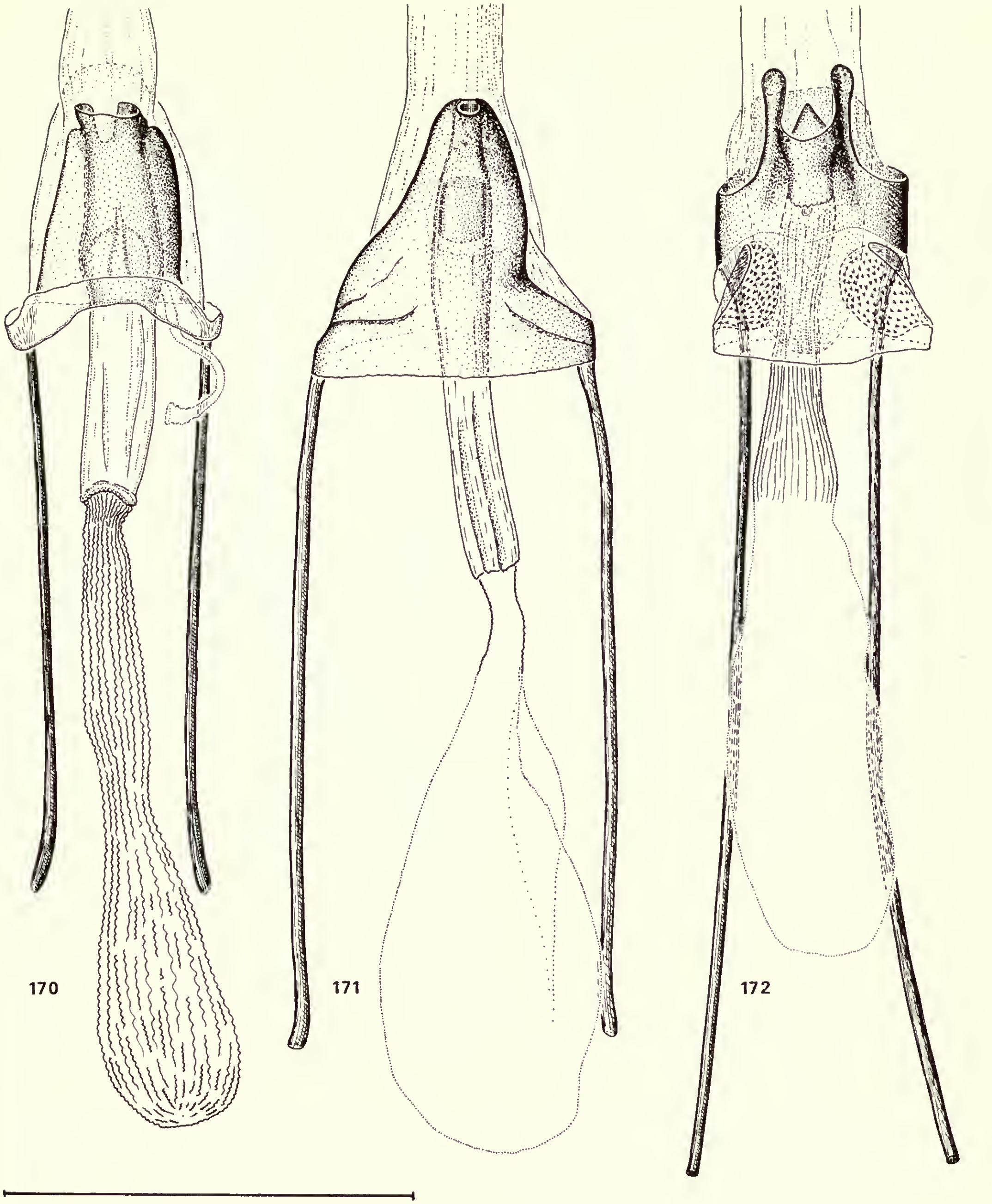
Figs 158, 159 Female genitalia of *Cranaodes* species. 158, *stereopa*; 159, *sequestrata*. Scale line = 1 mm.



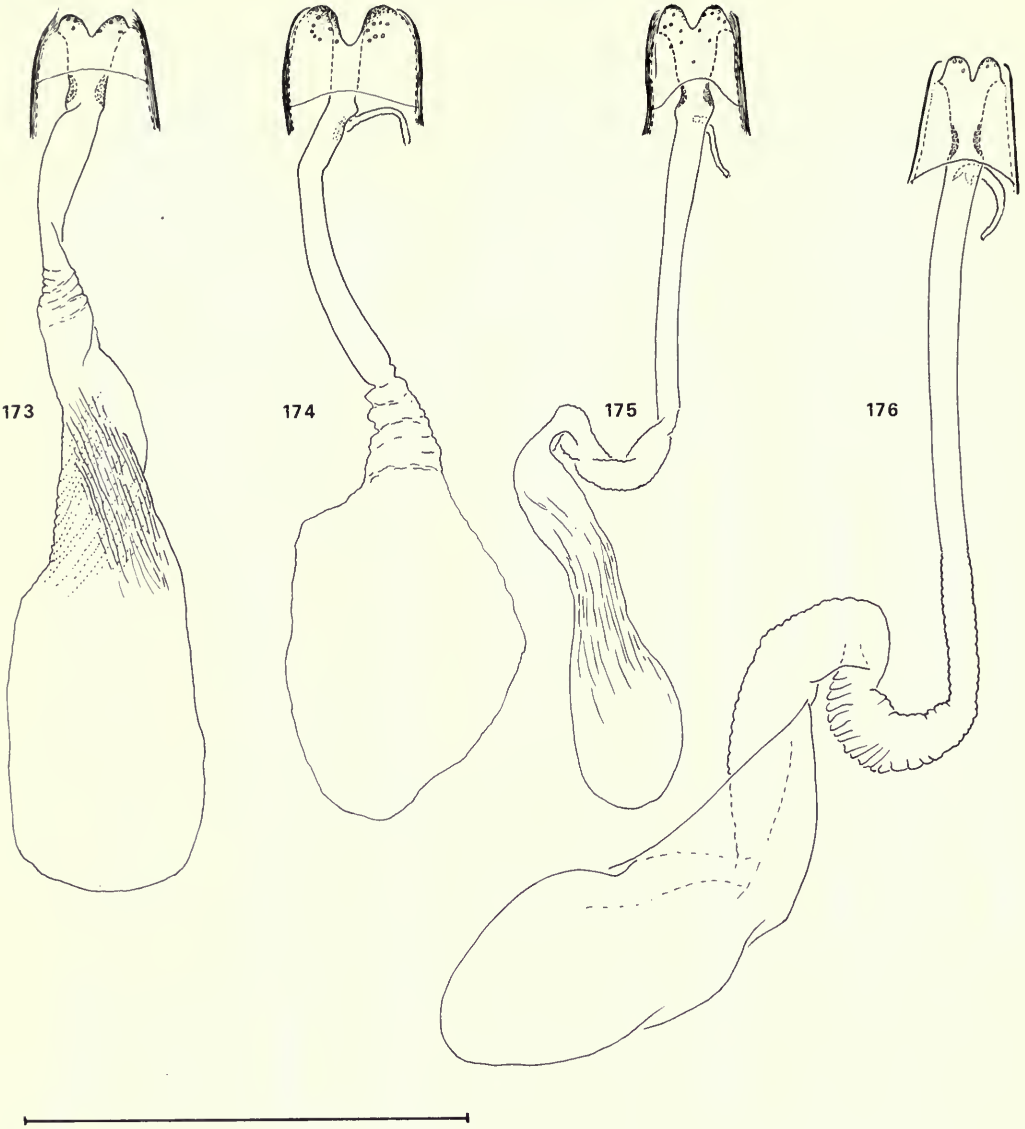
Figs 160–164 Female genitalia. 160, *Cnismorectis choritica*; 161, *Scardiella approximatella*. 162, 163, *Necroscardia* species. 162, *morticina*, paratype, with (163) seventh sternite; 164, *funeratella*, lateral view (pathological specimen). Scale line = 1 mm.



Figs 165–169 Female genitalia. 165, *Miniscardia minimella* (Brazil); 166, *Miniscardia* sp. (Arizona) (to half scale); 167–168, *Amorophaga rosemariae,* holotype, with (168) seventh sternite; 169, *Diataga leptosceles*. Scale line = 1 mm.



Figs 170–172 Female genitalia. 170, 171, *Diataga* species. 170, *mercennaria*, paratype; 171, *direpta*, holotype. 172, *Morophaga clonodes*. Scale line = 1 mm.



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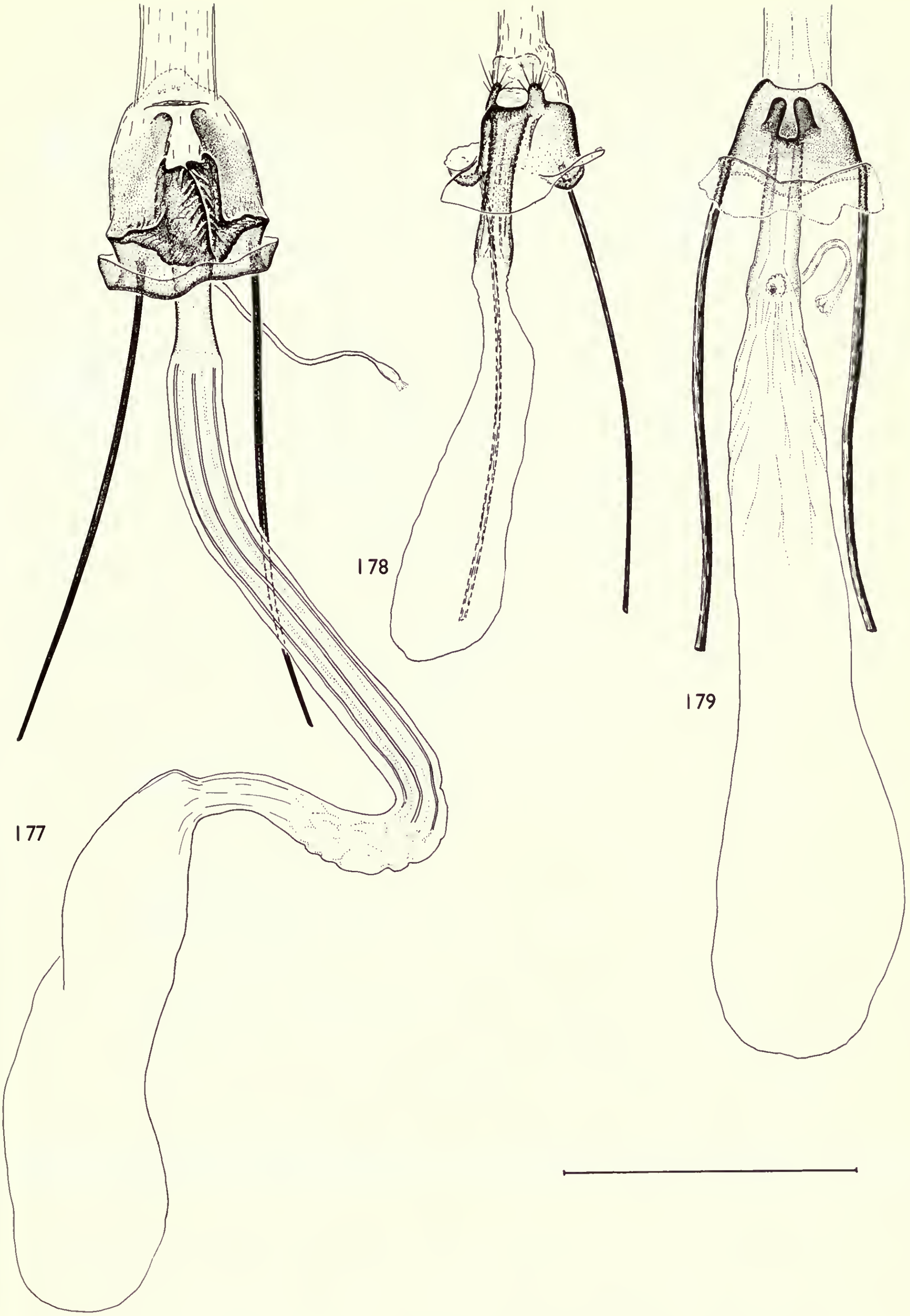

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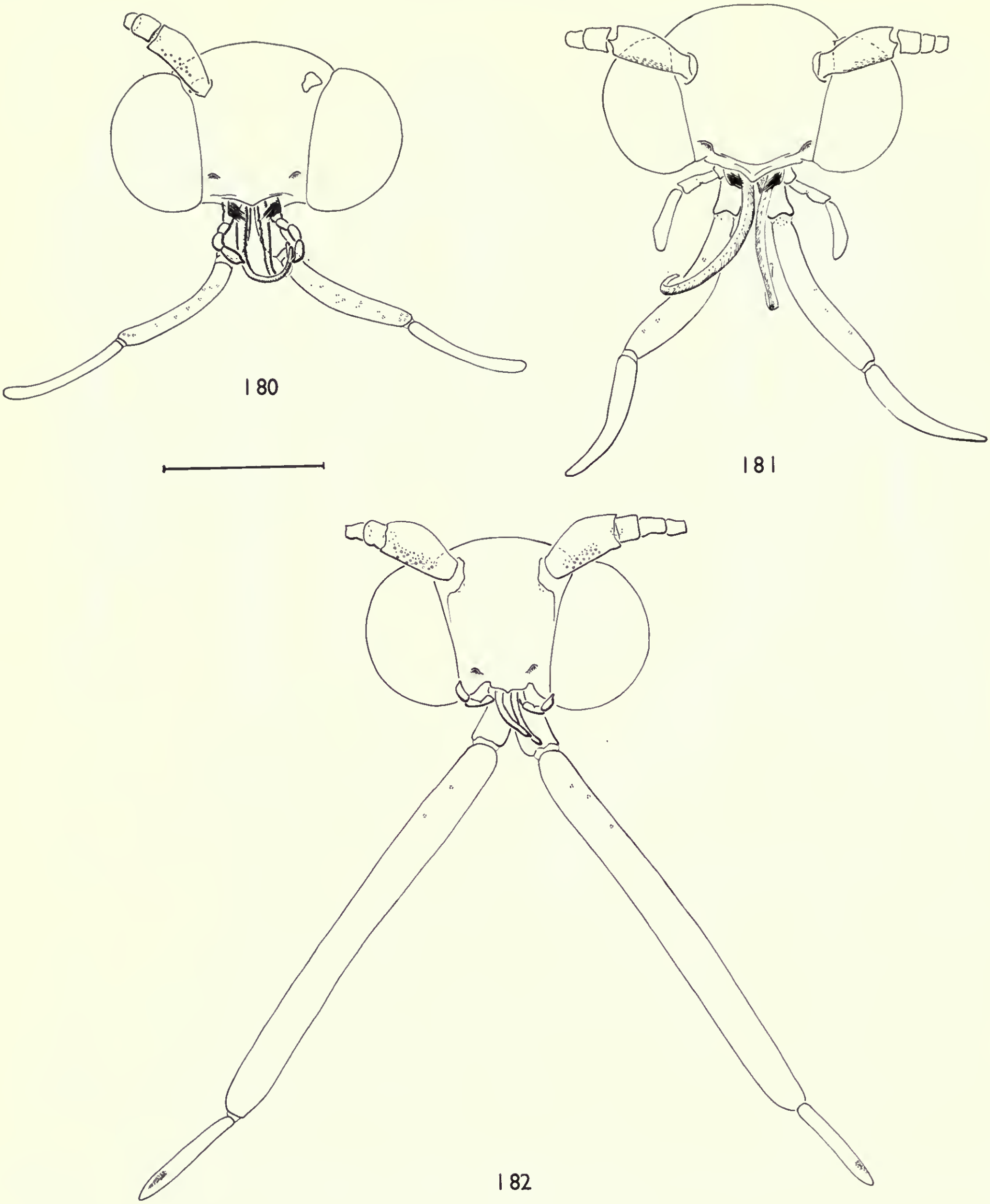

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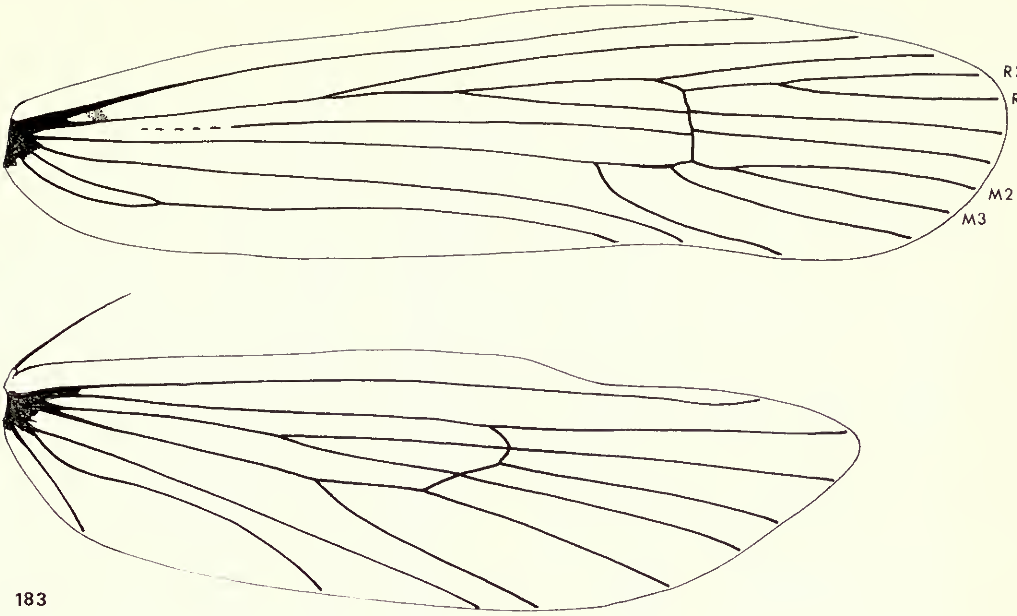

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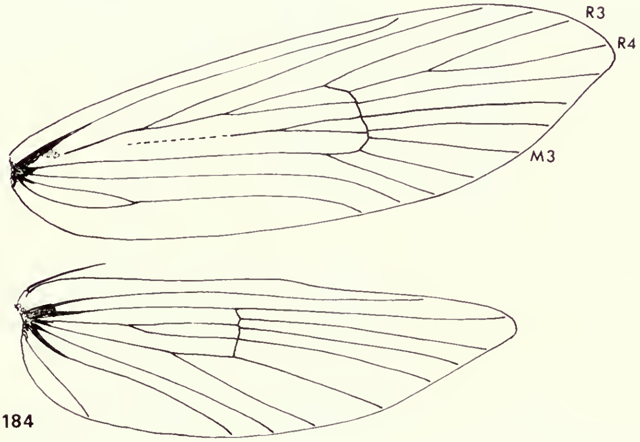

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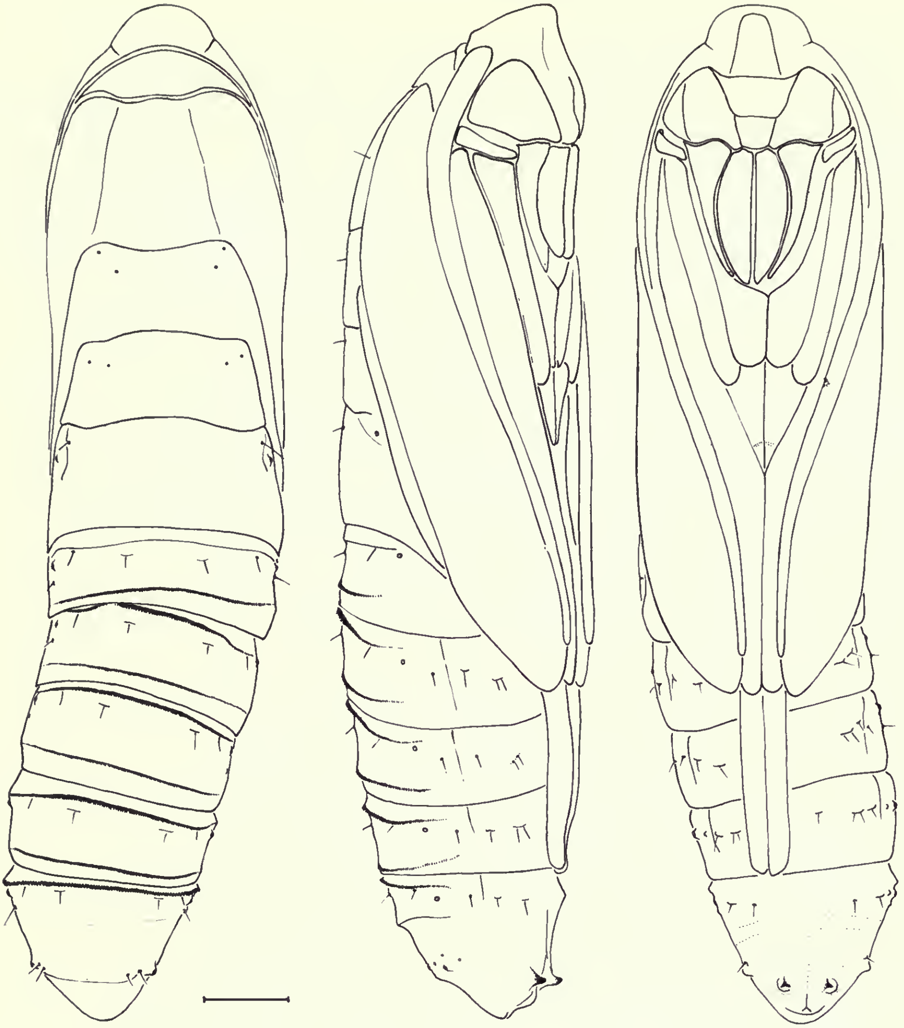

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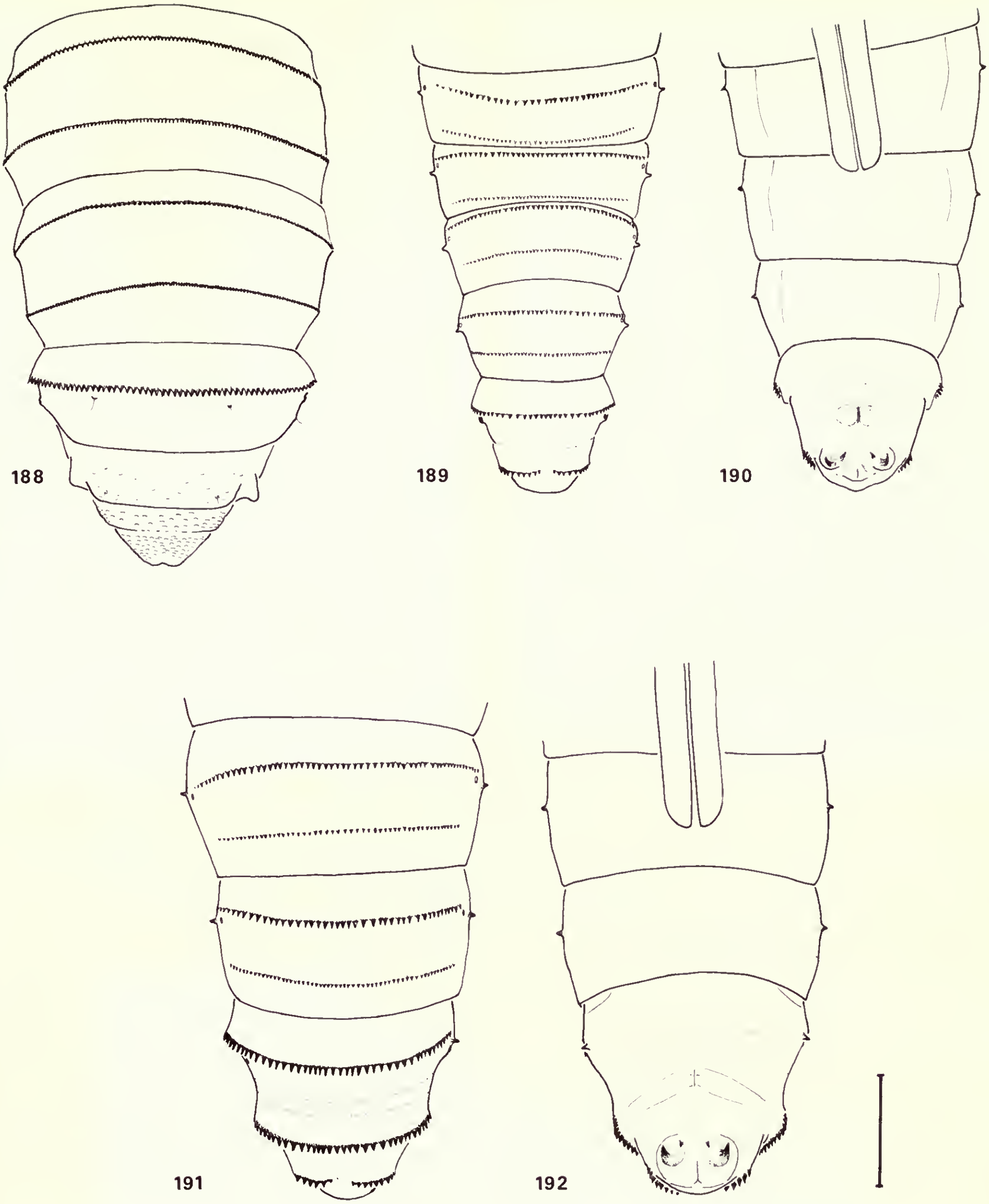

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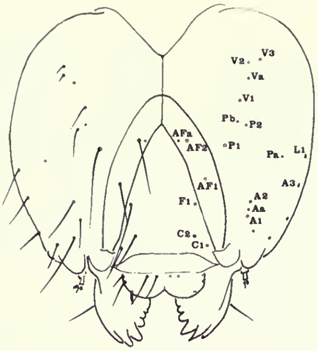

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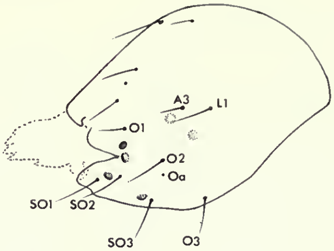

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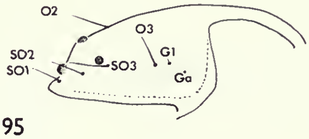

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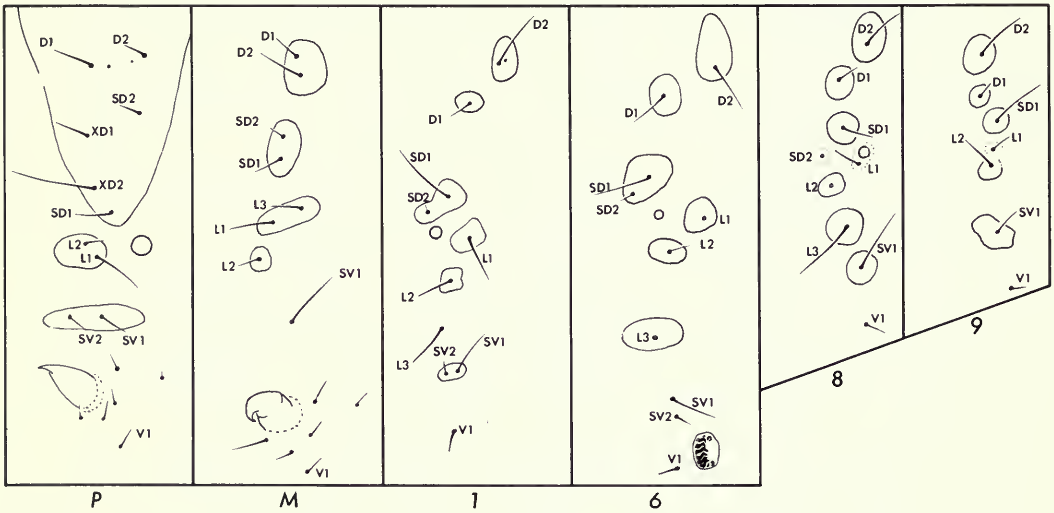

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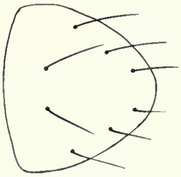

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A revision of the European Agathidinae (Hymenoptera: Braconidae)

G. E. J. Nixon

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Synopsis

Seven genera of the braconid subfamily Agathidinae are revised for the European zoogeographical region. Keys to the genera and species are provided. Fifty-four species are recognized as valid, 11 are newly synonymized, and 11, including an extralimital species from Jordan, are described as new. Lectotypes are designated for 13 nominal species. Authentic host records are included together with an account of the biology of the subfamily.

Introduction

Although the braconid subfamily Agathidinae has a world-wide distribution, it is poorly represented in the western Palaearctic region. The present revision deals with the fauna of Europe, including European U.S.S.R., and Turkey; one species from Jordan is included for comparative purposes.

Earlier contributions to the taxonomy of European Agathidinae are those of Nees von Esenbeck (1834), Wesmael (1837), Reinhard (1867), Thomson (1895), Marshall (1885; 1888) and Fahringer (1937). The more recent, notable taxonomic revisions on Palaearctic Agathidinae are those of Telenga (1955) and Tobias (1976*a*), the former concentrating on the European species, the latter on the Central Asian species. Their combined research reveals an agathidine fauna that hardly differs numerically from that covered in the present work. Even Tobias's paper (1976*b*) on the Far Eastern species of *Microdus* includes only four that are not represented in Europe.

The Agathidinae is well represented in the tropics and Shenefelt's catalogue (1970) lists

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numerous species; however, most of these will require investigation before their status can be properly assessed. Some attempt to sort out the chaos of names in the Oriental species has been made by Bhat & Gupta (1977), but other than this no major taxonomic research has been done on the tropical fauna. The classified, tropical material in the British Museum (Natural History) has been examined briefly; although quantitatively small and unreliably determined it provides some information on evolutionary trends within the Agathidinae. It seems that the subfamily divides into two main sections, the *Agathis-Microdus* group of genera which have lobed or simple claws and are restricted mainly to the Northern Hemisphere, and the *Cremnops-Disophrys* group of genera which are predominantly tropical in distribution. Shenefelt (1970) includes most of the described species in these two genus groups. *Microdus* is Holarctic but also occurs in the Southern Hemisphere. Two mainly tropical genera, *Cremnops* and *Disophrys*, are each represented by a single species in the western Palaearctic region.

Little can be said here about the North American Agathidinae, but *Agathirsia* Westwood exhibits a line of descent different from the two genera just mentioned. Its wing venation is typical of the subfamily but its body-form and especially the exaggerated length of the labium isolate it from the Old World genera.

The aim of the present review is to enable the reader to identify more easily the European species of Agathidinae; to postulate evolutionary trends within the subfamily is beyond its scope.

Depositories

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AS	Zoological Institute, Leningrad.
AZ	A. Zaykov collection, Plovdiv.
BMNH	British Museum (Natural History), London.
EH	Erasmus Haeselbarth collection, Munich.
HNHM	Természettudományi Múzeum, Budapest.
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels.
LC	Linnaean collection, Linnean Society, London.
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin.
MS	Mark Shaw collection, Edinburgh.
NM	Naturhistorisches Museum, Vienna.
RNH	Rijksmuseum van Natuurlijke Historie, Leiden.
UM	University Museum, Oxford.
USNM	National Museum of Natural History, Washington, D.C.
ZH	Zoological Museum, Helsinki.
ZI	Zoologiska Institutionen, Lund.
ZM	Zoologisk Museum, Copenhagen.
ZSBS	Zoologische Sammlung des Bayerischen Staates, Munich.

Taxonomic characters

The agathidine taxa studied in this revision are variable in colour, sculpture and ovipositor length, and *Agathis* and *Microdus* contain groups of what at first sight appear to be valid species but which subsequently prove to be inseparable because of intermediate forms. There are two alternatives: either the variants are regarded as different species, or a wide range of variation is accepted. The latter alternative has been chosen here since the concept of a species-aggregate, even if it offers no more than a provisional solution, at least avoids an increase in the number of dubious taxa. Nevertheless, species of Agathidinae have some characters that are reasonably constant and therefore useful for identification purposes.

The elongation of the head in facial view, though slightly variable, is frequently used in separating species of *Agathis*. It is defined as the length of the malar space measured against the longer diameter of the eye. The surface of the frons is also important, especially in *Agathis* in which it is either smooth, or provided with a deepened cavity or trough margined by raised keels. The conformation of this structure is diagnostic in such species as *breviseta* and *assimilis*.

Indispensable for at least a partial breakdown of species of *Agathis* are the mouth-parts. These are modified to form a beak, certain parts of which, especially the prementum, are much lengthened. Since the whole structure is, to some degree, retractile (and thus hidden), only the galea is used; this is attached to the base of the maxillary palpus, is constant in length and is generally visible. The thorax is uniform in shape though in *Agathis* it is subject to slight elongation. The notaulices are usually deeply impressed; when weak as in *Agathis nigra* and *Microdus lugubrator*, they may sometimes be absent in some specimens. Propodeal sculpture is variable and of limited value; within a species, such as *Agathis glabricula*, it can be entirely rugose or, more frequently, it has smooth, polished lateral panels. The number of teeth on the outer side of the middle tibia of *Agathis* is fairly constant; sometimes there are sufficient teeth (8–10, as in *fulmeki*) to be of diagnostic importance. In *Agathis* it is essential to examine the claws for the presence or absence of a lobe or tooth.

Venation is used very little to separate species. In *Microdus* the radius (*Rs*) is sometimes characteristically curved on the side towards the stigma, and in one species, *cingulipes*, the curvature is so pronounced as to be diagnostic. The shape of the second submarginal cell (referred to herein as the areolet) is virtually uniform in *Microdus*, but in *Agathis* it is variable, and can be intraspecifically either triangular or distinctly four-sided; rarely, as in *Agathis anglica*, the four-sided condition is so pronounced that it always retains its distinctiveness. Less variable and more reliable in separating species of *Agathis* is the ratio between the two abscissae of the postmarginalis (Fig. 67). This vein is the distal extension of the stigma along the edge of the wing known as *R*1; sometimes it continues beyond the point where it is joined by the radius (*Rs*) and thus becomes composed of two abscissae. The distal abscissa is sometimes so long as to be diagnostic, as in *Agathis minuta*.

In *Agathis*, the gaster rarely provides characters of taxonomic value, being in greater part smooth and polished. In *Microdus*, however, it frequently has sculpture that is specific, though variable in degree of intensity and definition. *Earinus gloriatorius* demonstrates the unreliability of gastral sculpture in the Agathidinae; in this species tergites 2+3 are sometimes smooth and polished, sometimes conspicuously rugose, with every intermediate condition.

Ovipositor length is fairly uniform and of little use in the identification of species. There is nearly always considerable distortion in the apical tergites of dried specimens so that the actual length of the ovipositor is difficult to determine; the length of the ovipositor sheaths is more easily assessed and it is this length compared with that of the whole body that is mentioned in the descriptions.

The morphological terms used in this revision are based on those of Richards (1977) and Eady (1974). The fused second and third tergites of the gaster are referred to as 'tergites 2+3' because, in the majority of braconids, these two tergites have the appearance of a single segment, morphologically bipartite only by the presence of two lateral spiracles.

Biology

As far as is known species of Agathidinae are internal parasites of lepidopterous larvae, but their biology has received little attention. There are a few exceptions, however. Simmonds (1947) described the life history of *Agathis vulgaris* (Cresson), a parasite of *Loxostege sticticalis* (L.), the sugar-beet web-worm in North America, and gave a detailed account of the morphology of the early stages of the parasite and an assessment of its value in biological control. Simmonds considered *Agathis vulgaris* to be an important parasite of its host and in fact found it to be the most frequently bred parasite in his experiments.

Dondale (1954) described the biology of *Microdus dimidiator* Nees von Esenbeck under the name *Agathis laticinctus* Cresson (Krombein *et al.*, 1979: 193). It is one of the parasites attacking the eye-spotted bud moth, *Spilonota ocellana* (Denis & Schiffermüller), an orchard pest in temperate North America. According to Dondale, the eggs of the parasite are deposited within the host during August and by early September have given rise to polypod, first-stage larvae which then enter a winter diapause. The overwintering larvae can be found within the host-caterpillars until the following July. The host-caterpillar reaches maturity and spins its cocoon in late June or early July; the larva of the parasite then bores its way out and feeds externally on the juices of the host during a period of three or four hours, finally destroying it. Dondale does not consider *Microdus dimidiator* to be a particularly successful parasite but his paper, with its excellent illustrations of larval structures, is a notable contribution to the biology of *Microdus*.

Thorpe (1933) gave a brief account of the biology of *Microdus pumilus* Ratzeburg, a parasite of *Coleophora laricella* (Hübner), the larch case-bearer. He figured the first and second instar larvae of the parasite but had no material of the later stages. He found *Microdus pumilus* to be very rare in England and, in spite of breeding a wide range of parasites from the host, obtained it only from the Forest of Dean, Gloucestershire. Host-material from the south of France, on the other hand, produced *pumilus* in abundance, the parasite reaching a level of 12 per cent, the adults emerging in June. The first instar of the parasite diapauses through the winter within its host and in this respect resembles *Microdus dimidiator*. According to Tobias (1964), one of the most serious pests of agriculture in Armenia is the Mallow moth, *Pexicopia (Pectinophora) malvella* (Hübner). Over a number of years parasites of this moth were bred by A. S. Avetyan, among them *Agathis malvacearum* Latreille. Tobias does not assess the significance of *malvacearum* in the control of *Pexicopia malvella* and used Avetyan's bred material mainly to study the parasite's seasonal variability in size and colour.

The Agathidinae, apart from *Agathis vulgaris* (mentioned above), have not been used in biological control in the tropics, consequently the literature provides only casual information on life-cycles. Gupta (1964), however, bred specimens of an *Agathis* sp. from the larvae of *Holcocera pulverea* Meyrick, the Lac predator. These were sent to C. F. W. Muesebeck who identified them as *Agathis festiva* Muesebeck, a parasite of the Oriental fruit moth, *Grapholita molesta* Busck, in China. Gupta states that nothing much is known about the biology of *festiva*, and suggested that it is hardly more than an occasional parasite of *pulverea* but that it may also parasitise other lepidopterous larvae occupying similar habitats.

Host records

HOST	PARASITE
LEPIDOPTERA	
BLASTOBASIDAE	
Blastobasis lignea Walsingham	*Microdus rugulosus*
COLEOPHORIDAE	
Coleophora granulatella Zeller	*Agathis artemesiana*
Coleophora flavipennella (Duponchel)	*Microdus lugubrator*
Coleophora frischella (L.)	*Microdus cingulipes*
Coleophora glaucicolella Wood	*Agathis minuta*
Coleophora halophyella Zimmerman	*Agathis asteris*
Coleophora hemerobiella (Scopoli)	*Microdus lugubrator*
Coleophora laricella (Hübner)	*Microdus pumilus*
Coleophora lutipennella (Zeller)	*Microdus lugubrator*
Coleophora meridionella Klimesch	*Agathis meridionellae*
Coleophora troglodytella (Duponchel)	*Agathis glabricula*
GELECHIIDAE	
Anarsia eleagnella Kuznetzov	*Baeognatha armeniaca*
Apodia bifractella (Duponchel)	*Agathis tibialis*
Caryocolum fraternella (Douglas)	*Microdus cingulipes*
Chrysoesthia hermannella (Fabricius)	*Agathis meridionellae*
Chrysoesthia sexguttella (Thunberg)	*Agathis meridionellae*
Metzneria lappella (L.)	*Agathis varipes*
Pexicopia malvella (Hübner)	*Agathis malvacearum*
Ptocheuusa paupella (Zeller)	*Agathis tibialis*
Recurvaria nanella (Denis & Schiffermüller)	*Baeognatha armeniaca*

NOCTUIDAE	
Agrochola circellaris (Hufnagel)	*Earinus nitidulus*
Agrochola lota (Clerck)	*Earinus nitidulus*
Atethmia centrago (Haworth)	*Earinus nitidulus*
OECOPHORIDAE	
Agonopterix ciliella (Stainton)	*Earinus gloriatorius*
Agonopterix heracliana (L.)	*Earinus gloriatorius*
PYRALIDAE	
Eurrhypara hortulata (L.)	*Cremnops desertor*
Myelois cirrigerella (Zincken)	*Agathis varipes*
Pyrausta aurata (Scopoli)	*Agathis griseifrons*
SESIIDAE	
Conopia spheciformis (Denis & Schiffermüller)	*Cremnops desertor*
TINEIDAE	
Morophaga boleti (Fabricius)	*Microdus calculator*
Triaxomera parasitella (Hübner)	*Microdus calculator*
TORTRICIDAE	
Cydia molesta (Busck)	*Agathis festiva*
	Microdus rufipes
	Microdus conspicuus
Cydia pomonella (L.)	*Cremnops desertor*
	Microdus conspicuus
Cydia funebrana (Treitschke)	*Baeognatha armeniaca*
Dichrorampha acuminatana (Lienig & Zeller)	*Microdus tumidulus*
Epinotia mercuriana (Frölich)	*Agathis anglica*
Epiblema scutulana (Denis & Schiffermüller)	*Microdus clausthalianus*
Gypsonoma dealbana (Frölich)	*Microdus rufipes*
Hedya nubiferana (Haworth)	*Microdus rufipes*
Pammene regiana (Zeller)	*Microdus conspicuus*
Rhopobota ustomaculana (Curtis)	*Microdus conspicuus*
Rhyacionia buoliana (Denis & Schiffermüller)	*Microdus rufipes*
Spilonota ocellana (Denis & Schiffermüller)	*Microdus dimidiator*
	Microdus fortipes
	Microdus rufipes
Tortrix viridana (L.)	*Microdus dimidiator*

Most of the above names are based on Kloet & Hincks (1972).

AGATHIDINAE

Diagnosis. Disco-cubital vein ($Rs+M$) mostly undeveloped; hence 1st discoidal cell and 1st submarginal cell confluent, except in *Earinus* Wesmael; 2nd submarginal cell usually very small, triangular or subtriangular, forming an areolet (Fig. 50); when large (not much!) then 4-sided and often with accessory vein arising from outer side of 2nd transverse cubitus (2*rm*) (*Disophrys-Cremnops* genus-group); 2nd transverse cubitus absent in *Baeognatha* Kokujev; hence no closed areolet in this genus; radial cell always short, mostly narrow, terminating far proximal to apex of fore-wing (Figs 50, 55, 60).

Head in facial view elongate (*Disophrys-Cremnops* genus-group); less frequently transversely elliptical (*Microdus*). Mouth-parts mostly lengthened and drawn out in form of beak; maxillary palpus 5-segmented; labial palpus 4-segmented; in *Microdus* segment 3 of labial palpus sometimes so small that palpus appears to be 3-segmented.

Thorax of generalised form except in highly specialised western Palaearctic *Rhamphagathis* Tobias. Pronotum with deep pit on each side, separated internally by fenestra. Propodeum variable; strongly, almost symmetrically areolated by raised keels (*Disophrys-Cremnops* genus-group) and then spiracle elongate; smooth to rugose with at most two longitudinal keels and spiracle circular (*Agathis-Microdus* genus-group).

Gaster usually highly polished, smooth but tergites 2+3 often sculptured in *Microdus*; in the Afrotropical *Braunsia* Kriechbaumer, related to *Microdus*, the gaster shows a highly characteristic sculpture of strong striation. Spiracles of tergite 1 situated on dorsal plate. Ovipositor variable in length.

Based on knowledge of a relatively small sample of the subfamily, the above description has necessarily a restricted value. A study of the virtually unknown fauna of Australia and South America would certainly call for modifications.

The position of the Agathidinae with regard to the other braconid subfamilies has been defined by van Achterberg (1976). So far there is no evidence to contest the assertion that the Agathidinae can be separated from all other subfamilies by the venation of the fore-wing: the short radial cell in combination with the small second submarginal cell provides a character not found elsewhere in the Braconidae. This character is in general supported by the elongation of the head.

Van Achterberg (1984) has given a more up-to-date review of the phylogeny of the Braconidae based upon a comprehensive cladistic analysis.

Key to European genera

1 Hind claw cleft; frons with sharp keel or rounded ridge between external side of antennal insertion and lateral ocellus; inner spur of hind tibia very long, reaching middle of basal segment of hind tarsus 2

– Hind claw not cleft; frons unarmed or much more often with basal lobe or tooth; inner spur of hind tibia shorter, not reaching middle of basal segment of hind tarsus 3

2 Body entirely fulvous; fore-wing having dappled appearance, with broad, hyaline fascia beneath half yellow stigma and paler at base and apex; maxillary palpus in female with long bristles that are longer than palpal segments; ovipositor about as long as body **CREMNOPS** Förster (p. 191)

– Body variable in colour but always partly blackened; fore-wing without dappled appearance and at most with pale, hyaline streak beneath stigma; maxillary palpus of female with only very short hairs; ovipositor very short, projecting only slightly beyond apex of gaster **DISOPHRYS** Förster (p. 190)

3 First submarginal cell separated from 1st discoidal cell by a fully sclerotised vein (Fig. 67); sternaulus absent .... **EARINUS** Wesmael (p. 226)

– First submarginal cell more or less fused with 1st discoidal cell; sternaulus present (rarely reduced to a fine groove or virtually absent and then head in facial view elongate) 4

4 Fore-wing without a closed areolet (2nd submarginal cell) .... **BAEOGNATHA** Kokujev (p. 229)

– Fore-wing always with a closed areolet (2nd submarginal cell) 5

5 Middle lobe of mesoscutum deeply hollowed out to form a wide trough, each side of which shows anteriorly as a blunt projection or shoulder; clypeus in profile in form of a short snout; mandible broadened, flattened, slightly concave on external side **RHAMPHAGATHIS** Tobias (p. 214)

– Middle lobe of mesoscutum of ordinary form, evenly convex in front; clypeus in profile not or only very slightly projecting; mandible not thus broadened or concave externally 6

6 Head in facial view always elongate; mouth parts almost always lengthened in form of beak, the galea at least 1.5 times longer than wide. (In *minuta*, which has a very short galea, the head in facial view is subtriangular.) .... **AGATHIS** Latreille (p. 192)

– Head in facial view strongly transverse, rarely slightly lengthened as in *linguarius*; mouth parts never lengthened in form of beak, galea not longer than wide **MICRODUS** Nees von Esenbeck (p. 215)

Synonymic list of species

AGATHIS Latreille
  achterbergi **sp. n.**
  anchisiades **sp. n.**
  anglica Marshall
    albanica Fischer **syn. n.**
  ariadne **sp. n.**
  artemesiana Fischer
  assimilis Kokujev
  asteris Fischer
  breviseta Nees von Esenbeck

- ***fulmeki*** Fischer
- ***glabricula*** Thomson
    - *albicostellae* Fischer **syn. n.**
- ***glaucoptera*** Nees von Esenbeck
- ***gracilipes*** Hellén
- ***griseifrons*** Thomson
    - *laticarpa* Telenga **syn. n.**
- ***malvacearum*** Latreille
- ***melpomene*** **sp. n.**
- ***meridionellae*** Fischer
- ***minuta*** Niezabitowski
- ***montana*** Shestakov
- ***nigra*** Nees von Esenbeck
    - *testaceipes* Fischer **syn. n.**
- ***pappei*** **sp. n.**
- ***pedias*** **sp. n.**
- ***persephone*** **sp. n.**
- ***polita*** **sp. n.**
- ***rostrata*** Tobias
- ***rufipalpis*** Nees von Esenbeck
- ***semiaciculata*** Ivanov
- ***syngenesiae*** Nees von Esenbeck
- ***taurica*** Telenga
- ***tibialis*** Nees von Esenbeck
- ***umbellatarum*** Nees von Esenbeck
    - *kolazyi* Fischer **syn. n.**
- ***varipes*** Thomson
- ***zaykovi*** **sp. n.**

BAEOGNATHA Kokujev
- ***nigra*** Telenga
- ***armeniaca*** Telenga

CREMNOPS Förster
- ***desertor*** (L.)
    - *deflagrator* (Spinola)

DISOPHRYS Förster
- ***caesa*** Klug
    - *anthracina* Kriechbaumer **syn. n.**

EARINUS Wesmael
- ***elator*** (Fabricius)
    - *nitidulus* Nees von Esenbeck **syn. n.**
    - *thoracicus* Nees von Esenbeck **syn. n.**
- ***gloriatorius*** (Panzer)
    - *affinis* Wesmael
    - *varicoxis* Wesmael **syn. n.**
    - *delusor* Wesmael **syn. n.**
    - *tuberculatus* Wesmael **syn. n.**
    - *bicingulatus* Thomson **syn. n.**
    - *ochropes* Lyle **syn. n.**
- ***transversus*** Lyle

MICRODUS Nees von Esenbeck
- ***calculator*** (Fabricius)
    - *abscissus* Ratzeburg
- ***cingulipes*** Nees von Esenbeck
- ***clausthalianus*** (Ratzeburg)
- ***conspicuus*** Wesmael
    - *arcuatus* Reinhard **syn. n.**
    - *zonatus* (Marshall)
- ***dimidiator*** Nees von Esenbeck
- ***eriphyle*** **sp. n.**

fortipes Reinhard
linguarius Nees von Esenbeck
lugubrator Ratzeburg
nugax Reinhard
pumilus Ratzeburg
rufipes Nees von Esenbeck
rugulosus Nees von Esenbeck
tumidulus Nees von Esenbeck
tegularis Thomson **syn. n.**
***zaykovi* sp. n.**
RHAMPHAGATHIS Tobias
nasicornis Telenga

DISOPHRYS Förster

Disophrys Förster, 1862: 246. Type-species: *Ichneumon inculcator* Linnaeus sensu Förster, 1862 (= *Agathis caesa* Klug).
Diophrys Kriechbaumer, 1898: 181. [Unjustified emendation.]

I have examined the original specimen of *Ichneumon inculcator* Linnaeus which is in the LC, London. It is an ichneumonid and as such has been dealt with by Fitton (1978) and van Rossem (1969).

Förster makes no mention of what material he had but merely cites *Ichneumon inculcator* L. as the type-species of *Disophrys*, adding a reference to Nees von Esenbeck: 'Agathis inc. Hym.ichn.aff.Mon. 1: 138'.

In view of the above, *Disophrys* must either be considered a genus in the Ichneumonidae, or interpreted as actually described by Förster. The latter course has been followed here but ratification will be required by the International Commission for Zoological Nomenclature.

The oldest available name for the species misidentified by Förster is *caesa* Klug, 1835, described from a female taken by Waltl at Puerto Real in Andalucia, Spain. This specimen has been examined; it bears a label, presumably in Klug's handwriting: 'Andalusien, Waltl d.' and another, red, marked 'type'. I have labelled this specimen as '*Agathis caesa* Klug. Holotype ♀, G. E. J. Nixon, 1984', this being the name under which it was originally described.

Diagnosis. Head in facial view elongate. Galea of maxillary palpus fully 3 times longer than greatest width; labial palpus 4-segmented; two apical segments subequal. Ocelli in high triangle; posterior tangent to anterior ocellus not touching posterior pair. Antennal sockets on inner side each with raised, sublamelliform tubercle; in frontal view of head, space between antennal sockets shows as bilobed projection. Frons on each side with raised ridge. Notaulices deeply impressed. Areolet of fore-wing 4-sided; outer side of 2nd transverse cubitus (*r–m*) with stub of vein; radius leaving stigma in basal third; distal abscissa of postmarginalis about half as long as proximal abscissa. Propodeum with strongly raised ridges enclosing areas of uneven size; spiracle large, subellipitical. Inner spur of hind tibia reaching middle of basal segment of hind tarsus; outer side of middle tibia without teeth; claws cleft. Gaster smooth, polished. Ovipositor projecting only slightly beyond apex of gaster.

The above diagnosis is based on the type-species and cannot therefore encompass the range of structure that may later be found to be acceptable for a more realistic definition of the genus.

Although numerous species of *Disophrys* have been described from the tropics (Shenefelt, 1970), only four are known from the Palaearctic region. As well as *caesa*, these are *calcaratrix* Telenga (1955), *dissors* Kokujev (1903) and *manifesta* Kokujev (1903), all from Central Asia and all represented by at least one example in the BMNH. Examination of these three species suggests that modifications of the generic concept of *Disophrys* will include variation in the surface sculpture of the hind tibia (*manifesta*), the thickness and vestiture of the longer hind tibial spur (*calcaratrix*), and the strength and sharpness of the frontal keel (*manifesta*).

Disophrys caesa (Klug)

Agathis caesa Klug, 1835: 89. Holotype ♀, Spain (MNHU) [examined].
[*Ichneumon inculcator* Linnaeus; Förster, 1862: 246. Misidentification.]
Disophrys caesus (Klug) Marshall, 1890: 574.
Diophrys [sic] *anthracina* Kriechbaumer, 1898: 185. LECTOTYPE ♂, Spain (ZSBS), here designated [examined]. **Syn. n.**
Disophrys anthracina Kriechbaumer; Szépligeti, 1904: 124.

♂ ♀, 8–11 mm long (excluding ovipositor). Body varying in colour from almost entirely red (holotype of *caesa*) to entirely black (*anthracina*). Hind tibia varying from black and red to entirely black. Basal half of fore-wing either entirely infumate or with median and submedian cells almost hyaline (lectotype of *anthracina*).

♀. Head from above strongly transverse; in facial view somewhat variable; in nominate form decidedly elongate but less so in central European examples. Face strongly raised along middle line, covered with much coarse punctuation or, towards antennal insertions, rugose-punctation; face also much deepened at site of toruli. Frontal ridge strongly raised, sharp. Galea about 0.75 times longer than malar space. Antenna with 40–48 segments; flagellum tapering apically; middle segments almost transverse. Mesoscutum in profile sloping very gradually towards pronotum in Spanish specimens; in examples from further eastwards, the slope becomes steeper; this is correlated with smaller size and increase of red colour. Prepectal keel strong, well defined. Sternaulus in form of a wide trough, crossed by very strong rugae. Hind coxa above very coarsely rugose-reticulate; rugose area often separated from the weak oblong trough alongside it by a raised ridge; hind femur densely covered with shallow pits; hind tibia much roughened through dense covering of tiny, oblong tubercles; inner spur of hind tibia unmodified, about 1.5 times longer than outer one and reaching only slightly beyond middle of basal segment of hind tarsus. Gaster smooth, polished. Ovipositor sheath about 3 times longer than basal segment of hind tarsus.

♂. Like female except for sexual differences.

MATERIAL EXAMINED (from the Iberian Peninsula)

Portugal: 1 ♂, near Coimbra, Beira littoral, 22.vii.1970 (*Pronk*) (RNH). **Spain**: 1 ♀, Albarracin (RNH); 1 ♀, Ost Peja, 11.vii.1894 (RNH); 1 ♀ (holotype of *caesa*), Andalucia, Puerto Real (*Waltl*) (MNHU); 5 ♂, 3 ♀, Barcelona, Calella d. Costa, vi.1971 (*Bouček*) (BMNH); 1 ♀, Burgos, 26.vi.1961 (RNH); 1 ♂, 1 ♀, Jaen, Las Correderas (RNH); 2 ♂ (lectotype and paralectotype of *anthracina*), Castille, Cuenca, 1896 (*Korb*) (ZSBS).

Other material examined

8 ♂, 34 ♀. **Austria**, **Greece**, **Hungary**, **Turkey**, **Yugoslavia** (all BMNH).

COMMENTS. Two males of the original material collected by Korb in Castille, Cuenca, and sent by him to Kriechbaumer, are in ZSBS; they agree with the original description in all respects except sex (Kriechbaumer stated that he had three females but found difficulty in sexing specimens of *Disophrys*). A male labelled 'Castilien, Cuenca, Korb 1896' is here designated as lectotype; the second specimen is labelled paralectotype.

CREMNOPS Förster

Cremnops Förster, 1862: 246. Type-species: *Ichneumon desertor* Linnaeus, by monotypy.

Achterberg (1982: 136) has caused confusion concerning the correct identity of the type-species of *Cremnops* and questions whether the latter is valid or a synonym of *Vipio* Latreille (1804: 173). His argument hinges on whether *Ichneumon desertor* L., 1758 and what he calls *Ichneumon desertor* F. (recte *I. desertor* L. sensu F., 1775) refer to the same species. He considers that they represent a single species as is clear from his statement '*Ichneumon desertor* Fabricius is not a separate species, since Fabricius cited in his first description only the original description of *Ichneumon desertor* Linnaeus, 1758, together with the reference to Linnaeus' description. Therefore there cannot be any doubt that there is no separate species named *Ichneumon desertor* Fabricius. This fact was overlooked by Bradley (1919: 59) when he stated that "the type of *Vipio* Latreille is *Ichneumon desertor* Fabricius, not of Linnaeus"'. Achterberg continues 'Because nomenclatorily *Ichneumon desertor* Fabricius is actually *I. desertor* Linnaeus, 1758, the genus *Vipio* Latreille . . . becomes . . . a senior synonym of *Cremnops* Förster, 1862'. Obviously the truth of this statement depends on the validity of his previous statement. It can be shown that Achterberg's reasoning is false and that he misinterpreted Bradley (1919) as well as several earlier workers. He weakens his argument by stating that 'At present in the Fabricius collection there are specimens under *desertor* which are not conspecific (or congeneric) with *I. desertor* Linnaeus and this indicated only that Fabricius had difficulties in interpreting *I. desertor* Linnaeus'. This remark does not only indicate that Fabricius had trouble in interpreting *I. desertor* Linnaeus but implies also that he misidentified the Linnaean species and that *I. desertor* L. sensu F., 1775, could in fact represent a different taxon. Earlier workers such as Latreille (1804), Nees von Esenbeck (1834) and Förster (1862) also considered that Fabricius had misidentified *desertor* L. and that the species he had belonged to a different group of Braconidae. Latreille (1804) placed what he called *desertor* F. (recte *desertor* L. sensu F.) with two other species in his genus *Vipio*. The Fabrician interpretation of *desertor* L. has been associated with this generic name ever since, having been cited as the type-species of *Vipio* by Förster (1862). *Ichneumon desertor* L., on the other hand, has long been recognised as an agathidine and is the type-species of *Cremnops* by monotypy. Since it is obvious that *I. desertor* L. and *I. desertor* L. sensu F. refer to radically different species, Achterberg's (1982) contention that *Vipio* and *Cremnops* are synonyms because they have the same type-species is incorrect.

The critical references in the taxonomic history of the name *desertor* are as follows.

Linnaeus, 1758: 563. Original description of *Ichneumon desertor*.
Fabricius, 1775: 334. *Ichneumon desertor* L. sensu F., 1775.
Latreille, 1804: 173. *Ichneumon desertor* L. sensu F., 1775. Transferred to genus *Vipio* Latreille.
Förster, 1862: 235. *Ichneumon desertor* L. sensu F., 1775. Cited as type-species of *Vipio* Latreille.
Spinola, 1808: 101. *Bracon deflagrator*, erected (unnecessarily) as replacement name for *I. desertor* L.
Nees von Esenbeck, 1834: 125. *Bracon deflagrator* Spinola transferred to genus *Agathis*, with *I. desertor* L. wrongly placed as junior synonym.
Förster, 1862: 246. *Agathis deflagrator* (wrongly attributed to Nees von Esenbeck) cited as type-species of *Cremnops*. Correct citation should have been '*Agathis deflagrator* (Spinola) sensu Nees, 1834'.

DIAGNOSIS. ♂ ♀. Head in facial view elongate. Mouth parts lengthened; galea fully twice as long as wide. A blunt keel, an extension of the outer rim of antennal socket, extends obliquely across frons half way towards posterior ocellus. Frons bilobed between antennal insertions. Propodeum almost symmetrically areolated by sharply raised keels; propodeal spiracle narrowly oval. Outer side of middle tibia without trace of teeth (cf. *Agathis* and *Microdus*). First abscissa of mediella of hind wing much shorter than second; areolet of fore-wing 4-sided with stub of vein arising from outer side of 2nd transverse cubitus. Gaster polished, smooth.

Cremnops desertor (Linnaeus)

Ichneumon desertor Linnaeus, 1758: 563. Holotype ♀, EUROPE (LC) [examined].
Bracon deflagrator Spinola, 1808: 101. [Unnecessary replacement name for *I. desertor* Linnaeus.]
Agathis deflagrator (Spinola) Förster, 1862: 246. [Attributed to Nees von Esenbeck, 1834: 139.]

♂ ♀, 6–8 mm long (excluding ovipositor). Entirely bright fulvous. Wings with a broad hyaline fascia at middle and two large, almost confluent spots at apex of wing.

♀. Bristles of palpi upstanding, fully as long as palpal segments. Ovipositor sheath fully 0·66 times as long as gaster.

♂. Bristles of palpi of ordinary form, much shorter than palpal segments.

MATERIAL EXAMINED

9 ♂, 20 ♀. All from southern Europe. Tobias (1976) gives the range as Palaearctic.

HOST. I have seen no bred material. Tobias (1976) gives *Cydia (Grapholita) pomonella* L. (Tortricidae), *Eurrhypara hortulata* (L.) (Pyralidae) and *Conopia [Syanthedon] spheciformis* (Denis & Schiffermüller) (Sesiidae) as hosts, which include such a wide range of lepidopterous families that I doubt if all can be correct.

COMMENTS. The single European species can be easily recognised by its colour and by the long palpal bristles of the female.

AGATHIS Latreille

Agathis Latreille, 1804: 173 [no included species]; 1805: 175. Type-species: *Agathis malvacearum* Latreille, by subsequent monotypy.

DIAGNOSIS. Mostly black species, rarely entirely or partly marked with red. Head in facial view almost always elongate; if not markedly so then still clearly triangular. Ocelli always in a high triangle, the posterior tangent to the anterior ocellus not touching or cutting posterior pair. Antenna in the species under review never with more than 40 segments. Mouth parts characteristically lengthened, forming a beak. Notaulices almost always present. Propodeum without areolation but with two more or less distinct medial longitudinal keels; surface on each side of these keels usually smooth, polished; rarely surface of propodeum rugose all over. Spurs of hind tibia short, always less than half as long as basal segment of hind tarsus; middle tibia with at least two teeth on its outer side in about apical third. Hind claw with or without a lobe or tooth but never cleft; each of the posterior metasternal foramena that receive the insertion of the hind coxae open on its inner side. First discoidal cell and first cubital cell confluent; 2nd cubital cell always small, most triangular, rarely obviously 4-sided. First tergite varying from entirely smooth to rugose-striate; tergites 2+3 rarely striate all over (*semiaciculata* Ivanov); sometimes with variable amount of broken rugose-striation distal to, and to sides of, faint, tranverse, blister-like swelling. Ovipositor at least as long as gaster.

Key to species (females)

1 Antennal sockets separated on inner side by distance equal to diameter of anterior ocellus. Species strongly marked with red; galea short, 1·5 times longer than wide **syngenesiae** Nees von Esenbeck (p. 196)

– Antennal sockets united on inner side to form a single keel 2

2 At least mesoscutum in greater part, or entirely, red 3

– Mesoscutum black 5

3 Head in dorsal view strongly produced backwards behind eyes; temples strongly swollen (Fig. 26) .... **malvacearum** Latreille (p. 202)

– Head in dorsal view less produced backwards behind eyes; temples not, or hardly, swollen 4

4 Head entirely black; galea 3·5 times longer than wide; frons in front of anterior ocellus jutting forwards and showing as a V- or U-shaped cavity; malar space slightly shorter than longer diameter of eye; areolet of fore-wing 4-sided; ovipositor sheath as long as body **umbellatarum** Nees von Esenbeck (p. 197)

– Head at least almost entirely red; galea 3 times longer than wide; frons in front of anterior ocellus not jutting forwards and at most with shallow dimple here; malar space distinctly longer than longer diameter of eye, 4:3; areolet of fore-wing stalked; ovipositor sheath about equal to length of gaster .... **glaucoptera** Nees von Esenbeck (p. 195)

5 Mouth-parts much lengthened; galea at least 4 times longer than its basal width 6

– Mouth-parts less lengthened; galea at most 3·5 times longer than its basal width 8

6 Hind claw with strong lobe (Fig. 47); notaulices deeply impressed; at most a shallow dimple in front of anterior ocellus 7

– Hind claw without a lobe though a little, and abruptly, widened at base (Fig. 45). Head in facial view weakly elongate (Fig. 11); galea 4–5 times longer than basal width; notaulices often weak, sometimes almost obliterated .... **nigra** Nees von Esenbeck (p. 203)

7 Galea 6 times longer than its middle width; outer side of middle tibia with about 30 teeth and appearing densely spinose .... **taurica** Telenga (p. 204)

– Galea 4 times longer than its middle width; outer side of middle tibia with 6–8 teeth, some of them in pairs .... **zaykovi** sp. n. (p. 204)

8 Hind femur greatly lengthened, about 4·5 times longer than wide. Galea very short, only a little longer than wide .... **gracilipes** Hellén (p. 212)

– Hind femur not more than 3 times longer than wide 9

9 In front of anterior ocellus a V- or U-shaped, or parallel-sided, cavity, bounded by a ridge and prolonged below to form a keel between antennal sockets 10

– In front of anterior ocellus at most a shallow, subtriangular impression or dimple, or surface virtually flat; virtually no keel between antennal sockets or, if one is weakly indicated, then it is not continuous with any ante-ocellar impression that may be present 23

10 Galea very short, inconspicuous, not more than 1·33–1·50 times longer than wide 11

– Galea longer, at least twice as long as wide 13

11 Small species, 2·8–3·0 mm; head in facial view subtriangular (Fig. 29). Impression in front of anterior ocellus shallow; distal abscissa of postmarginalis hardly shorter than proximal abscissa .... **minuta** Niezabitowski (p. 208)

– Larger species, at least 4·0 mm; head in facial view markedly elongate. Hind claw with conspicuous lobe; distal abscissa of postmarginalis about 0·75 times longer than proximal abscissa 12

12 Ovipositor sheath not longer than gaster, about 1·5 times longer than hind tibia; flagellum somewhat thickened medially and thence tapering to apex, not markedly bristly **breviseta** Nees von Esenbeck (p. 197)

– Ovipositor sheath very distinctly longer than gaster and about twice as long as hind tibia; flagellum thinner, markedly bristly. Cavity in front of anterior ocellus deeper and more nearly parallel-sided than in *breviseta* **assimilis** Kokujev (p. 198)

13 Enclosed cavity in front of anterior ocellus U-shaped, almost jutting forwards as though on a prominence; stigma longer; radial cell longer 14

– Enclosed cavity in front of anterior ocellus only vaguely V- or U-shaped, not jutting forwards but lying in same plane as keel below it; stigma shorter; radial cell shorter.
Distal abscissa of postmarginalis at least 0·66 times longer than proximal abscissa; hind claw with conspicuous lobe 15

14 Head in dorsal view strongly produced backwards behind eyes; temples strongly swollen (Fig. 26); head in facial view much lengthened (Fig. 4); hind claw with basal tooth
malvacearum Latreille (p. 202)

– Head in dorsal view less produced backwards behind eyes; temples hardly swollen; head in facial view much less lengthened, subtriangular (Fig. 16); hind claw with large basal lobe
varipes Thomson (p. 199)

15 Notaulices virtually obliterated, at most a hardly visible line marking their course.
Hind claw with distinct lobe 16

– Notaulices clearly defined 17

16 Galea distinctly longer than malar space; a hardly visible line indicates course of notaulices; outer side of middle tibia with 8–9 irregularly spaced, thick teeth; thorax more elongate in profile ...... ***polita*** sp. n. (p. 206)

– Galea shorter, hardly as long as malar space; notaulices absent; outer side of middle tibia with 4–5 teeth arranged more or less in row; thorax less elongate in profile
persephone sp. n. (p. 206)

17 Segment 3 of middle tarsus very short, about 1·25 times longer than wide.
Tergite 1 sculptured right to apex 18

– Segment 3 of middle tarsus at least 1·5 times longer than wide 19

18 Ovipositor sheath about as long as gaster; head in facial view not strikingly lengthened
achterbergi sp. n. (p. 208)

– Ovipositor sheath nearly 1·5 times longer than gaster; head in fcial view strikingly lengthened (Fig. 6) ...... ***anchisiades*** sp. n. (p. 207)

19 V-shaped cavity in front of anterior ocellus narrow, deep.
Outer side of middle tibia with 7–8 teeth ...... ***rufipalpis*** Nees (p. 199)

– V-shaped cavity in front of anterior ocellus less narrow, somewhat shallow 20

20 Thorax in profile more elongate (Fig. 42); outer side of middle tibia with 6–10 closely spaced teeth.
Malar space very distinctly shorter than longer diameter of eye 21

– Thorax in profile much less elongate; outer side of middle tibia with 4–5 teeth arranged more or less in a row.
Distal abscissa of postmarginalis obviously shorter than proximal abscissa 22

21 Galea clearly longer than malar space, polished and virtually smooth; hind claw with conspicuous lobe and with deep cleft between lobe and claw proper; 3–4 distal segments of maxillary palpus markedly yellowish; distal abscissa of postmarginalis virtually equal to proximal abscissa ...... ***fulmeki*** Fischer (p. 198)

– Galea clearly shorter than malar space, dull, coriaceous; hind claw with only weak basal projection and no cleft between this and claw proper; maxillary palpus blackish throughout; distal abscissa of postmarginalis a little shorter than proximal abscissa ...... ***pedias*** sp. n. (p. 211)

22 Head in facial view wide across clypeus (Fig. 1), longer; hind femur less swollen; antenna with 26 segments; tergite 1 with clearer indication of sculpture over apical two-thirds
ariadne sp. n. (p. 206)

– Head in facial view much less wide across clypeus, shorter, somewhat triangular; tergite 1 highly polished over apical two-thirds; hind femur more swollen (Fig. 33); antenna with at most 23 segments ...... ***tibialis*** Nees von Esenbeck (p. 201)

23 Head in facial view hardly lengthened below eyes (Fig. 12); clypeus in lateral view of head markedly protuberant.
Wings hyaline; mandibles of powerful build; hind claw without lobe ...... ***pappei*** sp. n. (p. 212)

– Head in facial view always lengthened below eyes (sometimes nearly subtriangular); clypeus in lateral view of head not protuberant 24

24 Sternaulus reaching both anterior and posterior margin of mesopleurum.
Galea about 3 times longer than its widest part, somewhat abruptly narrowed in apical half; hind claw virtually without lobe ...... ***rostrata*** Tobias (p. 211)

– Sternaulus, if present, not reaching both anterior and posterior margin of mesopleurum or, if it almost reaches anterior margin, then galea shorter (*semiaciculata*) or hind claw with conspicuous lobe (*melpomene*) 25

25 Hind claw virtually without lobe, at most a denticle at apex of thickened, basal part.
Distal abscissa of postmarginalis very short; tergite 1 sculptured right to apex 26

– Hind claw with lobe; if weak (*anglica*), then areolet markedly 4-sided 29

26 Sternaulus absent or represented by a hardly impressed furrow; thorax elongate, almost twice as long as wide, 44 : 25, as seen in profile.
Species at most 2·5 mm excluding ovipositor; galea very distinctly longer than malar space, 7 : 4; flagellum distinctly thickened beyond middle .... **asteris** Fischer (p. 209)

– Sternaulus clearly defined; thorax less elongate, at most 1·66 times longer than wide as seen in profile 27

27 Galea shorter than malar space 28

– Galea as long as, or slightly longer than, malar space.
Face rather sharply narrowed below eyes in facial view (Fig. 28); ovipositor sheath about as long as propodeum plus gaster; basal, thickened part of hind claw sometimes with denticle at apex .... **glabricula** Thomson (p. 209)

28 Flagellum distinctly thickened distal to middle and thence tapered to apex; segment 10 from apex about 1·25 times longer than wide; head seen from above, with face just out of view, longer.
Ovipositor sheath short, about as long as gaster .... **artemesiana** Fischer (p. 210)

– Flagellum not thus thickened distal to middle and not tapered to apex; segment 10 from apex fully 1·5 times longer than wide; head seen from above, with face just out of view, shorter, more transverse .... **meridionellae** Fischer (p. 210)

29 Face densely pubescent.
Hind femur entirely, or in greater part, reddened; hind claw with well-developed tooth (Fig. 44); virtually no dimple in front of anterior ocellus and no keel between antennal sockets .... **griseifrons** Thomson (p. 202)

– Face with ordinary pubescence 30

30 Length at most 3·5 mm excluding ovipositor 31

– Length at least 4·0 mm excluding ovipositor 32

31 Thorax less elongate (Fig. 41); hind femur blackish; lobe of hind claw in form of weak projection or angulation; antenna with 27–29 segments .... **glabricula** Thomson (p. 209)

– Thorax more elongate; hind femur entirely reddish; lobe of hind claw in form of free projection; antenna with 23–24 segments .... **montana** Shestakov (p. 213)

32 Basal half of tergites 2+3 closely striate all over .... **semiaciculata** Ivanov (p. 205)

– Basal half of tergites 2+3 with at most very irregular striate-rugosity 33

33 Hind claw with conspicuous lobe; radial cell longer (Fig. 50) 34

– Hind claw with at most a weak, basal angulation; radial cell shorter (Fig. 49)
Head in facial view much narrowed below eyes (Fig. 18); tergite 1 sculptured right to apex; tergites 2+3 usually with conspicuous, very irregular striate rugosity distal to basal, transverse swelling .... **anglica** Marshall (p. 200)

34 Head in facial view subtriangular (Fig. 16); galea about as long as malar space
varipes Thomson (p. 199)

– Head in facial view much narrowed below eyes; galea 1·33 to 1·50 times longer than malar space .... **melpomene** sp. n. (p. 213)

Agathis glaucoptera Nees von Esenbeck

(Fig. 3)

Agathis glaucoptera Nees von Esenbeck, 1834: 128. Holotype ?♀, ITALY (lost).

♀, 7–8 mm long (excluding ovipositor). Almost entirely reddish yellow; ocellar region and scrobes blackish; mesosternum, mesopleurum and propodeal area black. Hind coxa varying from black to bright reddish yellow, like gaster; hind femur entirely reddish yellow.

Head in facial view markedly elongate; in this aspect differing from all other included species in that the face is only weakly narrowed towards the mouth (Fig. 3). Malar space about 1·25 times as long as longer diameter of eye. Inner rims of antennal sockets joined to form a keel that unites with a shallow, V-shaped impression in front of anterior ocellus. Anterior ocellus raised as though on a prominence. Antenna 31–33 segmented. Galea hardly twice as long as wide. Thorax in profile of generalised form. Notaulices deep but not costate. Sternaulus deep, wide, strongly costate. Propodeum without clearly defined, longitudinal keel but with several coarse rugae in their place. Areolet of fore-wing small, stalked; stigma relatively elongate; distal abscissa of postmarginalis at least 0·66 times longer than proximal abscissa; anellus of hind wing joining anal cell above middle. Hind claw with large, conspicuous lobe; outer side of middle tibia with 1–2, or without, teeth; inner spur of hind tibia powerful, reaching middle of basal segment of hind tarsus. Gaster rather short. Tergite 1 about 1·33 times longer than wide at apex, smooth, polished. Ovipositor sheath about as long as gaster.

MATERIAL EXAMINED

France: 1 ♀, Perpignan, 10.vi.1976 (*G. D. Slob*) (RNH). **Turkey**: 1 ♀, Konya, 11.vi.1971 (*Kl. Warnke*) (RHN). **Yugoslavia**: 1 ♀, Macedonia, R. Reshik, (*J. Waterston*) (BMNH).

HOST. Unknown.

COMMENTS. Marshall (1890) redescribed *glaucoptera* from a single female in poor condition but beyond doubt recognised the species correctly. Both Telenga (1955) and Tobias (1954; 1963) were in agreement with Marshall and these three authors have been followed here. *A. glaucoptera* is distinguished from all other species from the region by the shape of the head in facial view, in combination with the stalked areolet and the short ovipositor sheath. The point of emission of the anal vein in the hind wing is noteworthy and suggests that *glaucoptera* occupies a somewhat isolated position among the European species of *Agathis*.

Agathis syngenesiae Nees von Esenbeck

(Figs 5, 20)

Agathis syngenesiae Nees von Esenbeck, 1814: 192, 194. Syntypes, GERMANY (lost).

♂ ♀, 4·5–5·6 mm (excluding ovipositor).

♀, Body much marked with red; head varying from almost black to almost entirely red. Prothorax, mesoscutum, propodeum and mesosternum entirely black. Gaster almost entirely red.

Head in facial view markedly elongate (Fig. 5); seen from above, strongly transverse and only shallowly emarginate behind (Fig. 20). Malar space equal to, or slightly longer than, longer diameter of eye. Mouth parts short for genus; galea hardly 1·5 times longer than wide. Antennal sockets not united on inner side to form a single keel but separated by a distance fully equal to diameter of anterior ocellus. Antenna with 25–27 segments. Thorax moderately elongate, in profile as 13:8. Notaulices generally rather shallow. Sternaulus usually distinct but sometimes almost wanting, not extending beyond middle of mesopleurum. Sculpture of propodeum varying from coarsely reticulate all over to vaguely punctate-reticulate; the two longitudinal keels of *Agathis* (s.str.) virtually wanting. Areolet of fore-wing triangular, almost petiolate; stigma more elongate than that of other species of region; radial cell very narrow; radius sometimes slightly curved inwards towards stigma; distal abscissa of postmarginalis as long as proximal abscissa. Hind claw with somewhat short, dentiform lobe; outer side of middle tibia with 2–3 widely spaced teeth; inner spur of hind tibia falling far short of middle of basal segment of hind tarsus. Tergite 1 about 1·25 times longer than its apical width, polished, smooth. Ovipositor sheath 1·33–1·5 times longer than body. Hypopygium very shallowly, broadly emarginate at apex.

♂. Inner and outer orbits pale marked (2 ex., Turkey), otherwise generally black. Posterior half of gaster blackened. Antenna with 25–26 segments.

MATERIAL EXAMINED

France: 1 ♀, Carpentras (*Teunissen*) (RNH); 2 ♀, 1 ♂, Landes, St Girons Plage, on *Helychrysum stoechas* L. (*P. Pronk*) (RNH). **Germany**: 3 ♀, Ruthe Coll. (BMNH). **Holland**: 1 ♀, Terschelling (RNH); 1 ♀, Texel De Koog, pine forest, 6.ix.1969 (*L. Oosterweghel*) (RNH). **Portugal**: 1 ♀, Algarve, Val do Lobo, vii.1967 (*P. M. F. Verhoeff*) (RNH). **Spain**: 1 ♀, Cadiz, Jerez de la Frontera, viii.1967 (*P. M. F. Verhoeff*) (RNH). **Turkey**: 1 ♂, Uludag, viii.1962 (*Guichard & Harvey*) (BMNH); 2 ♀, 1 ♂, Bursa, near Karacabey, viii.1962 (*Guichard & Harvey*) (BMNH).

HOST. Unknown.

COMMENTS. This species closely resembles *umbellatarum* in colour but the two species are very different. Whereas *umbellatarum* is a typical *Agathis, syngenesiae* is in some respects like species of *Microdus*. The form of the keel between the antennal insertions approaches the condition found in *Microdus*. So also does the strongly transverse head as seen from above. Nevertheless, the elongate head and the lengthened mouth-parts relate *syngenesiae* more closely to *Agathis*. The form of the frons between the antennal insertions together with the short galea make the species easy to recognise.

Agathis umbellatarum Nees von Esenbeck

Agathis umbellatarum Nees von Esenbeck, 1814: 195. Syntypes, GERMANY (lost).
Agathis kolazyi Fischer, 1959: 2. Holotype ♂, YUGOSLAVIA (ZM) [examined]. **Syn. n.**

♂ ♀, 4·5–5·0 mm long (excluding ovipositor). In all material available the body is conspicuously marked with red. Head black. Mesoscutum, and at least side of pronotum, red. Gaster varying from entirely red to red with blackened apex. Wings strongly darkened.

♀. Head in facial view moderately lengthened; from above, strongly transverse, not produced backwards behind eyes as in *malvacearum* (cf. Fig. 26). Ocelli in a low, rather wide triangle. A moderately well-defined keel between antennal insertions; in front of anterior ocellus a well-defined excavation that tends to jut forwards. Malar space a little shorter than longer diameter of the eye, 11:14. Galea considerably longer than malar space, 14:11. Antenna with 23–26 segments: 23 (1), 24(2), 25 (5), 26 (3); flagellum somewhat tapered towards apex. Thorax in profile decidedly elongate. Notaulices sharply defined. The two longitudinal keels of propodeum sharply defined; side panels polished, virtually smooth all over. Radial cell decidedly long; areolet varying from triangular to distinctly 4-sided; distal abscissa of postmarginalis hardly 0·66 times as long as proximal abscissa. Inner spur of hind tibia falling considerably short of middle of basal segment of hind tarsus; outer side of middle tibia with very variable number of teeth, 2–14; hind claw with well-defined lobe; cleft between lobe and claw proper fully half as long as claw itself. Tergite 1 a little longer than apically wide, smooth, highly polished. Ovipositor sheath very slightly longer than body.

♂. Thorax sometimes entirely black; sometimes mesoscutum red. Antenna with 23–24 segments; two preapical segments about 1·33 times longer than wide.

MATERIAL EXAMINED

Bulgaria: 4 ♂, 1 ♀, v.–vi. (*Zaykov*) (ZC). **Cyprus**: 21 ♂, 5 ♀, iv.–vi. (*G. Mavromoustakis*) (BMNH). **France**: 2 ♀, Basses Alpes, Digne, vi. (*Slob*) (RNH). **Greece**: 1 ♀, Corfu, Acharavi, v. (*Oogstrom*) (RNH); 1 ♀, Kerfissos, vi. (*Mavromoustakis*) (BMNH); 1 ♀, Drosla, vi. (*Mavromoustakis*) (BMNH); 1 ♀, Ilia, vii. (*Day & Else*) (BMNH); 1 ♀, 2 ♂, Thessalia, Kalambaka, vii. (*Day & Else*) (BMNH). **Turkey**: 1 ♀, Ankara, Temelli, vii. (*Guichard & Harvey*) (BMNH); 1 ♀, Nigde, Kocas, vi. (*Guichard & Harvey*) (BMNH); 10 ♂, Istanbul, Yakuplu, vi. (*Oorshot & Wiering*) (RNH). **Yugoslavia**: 1 ♀, Macedonia, Gorica, x. (*van Achterberg* (RNH); 1 ♂ (holotype of *kolazyi*), Dalmatia, Ragusa (*Kolazy*) (ZM).

HOST. Unknown.

COMMENTS. This brightly coloured species has a Mediterranean distribution. It is very like the northern *varipes* Thomson and, beyond colour, there is very little to separate the two species. Both are characterised by the form of the ante-ocellar impression and the shape of the head in facial view. Thus seen, however, the face of *varipes* is slightly wider; *varipes* also has a shorter galea.

Agathis breviseta Nees von Esenbeck

(Fig. 52)

Agathis breviseta Nees von Esenbeck, 1814: 194. Syntypes, GERMANY (lost).

The type of *breviseta* is presumably lost. My interpretation of the species is based on that of Wesmael, the first reviser; I have examined two females (IRSNB), both bearing Wesmael's identification label but with no indication of locality.

♀, *ca* 3·5 mm long (excluding ovipositor). Black. Hind femur black; hind tibia blackish on apical three-fifths, with dark ring towards base.

Head in facial view considerably elongate. Malar space shorter than longer diameter of eye, 5:7. Galea dull, coriaceous, twice as long as wide. Between antennal sockets a short, knife-edged keel that projects above as a right angle before joining lowest point of deep cavity in front of anterior ocellus; this cavity deep, narrow, V-shaped. Ocelli in high triangle, the posterior tangent of front ocellus passing far in front of posterior ocelli. Antenna distinctly tapering from middle to apex, weakly bristly and with the two preapical segments about 1·33 times longer than wide; 29–30 segmented. Thorax in profile short, high. Notaulices deeply impressed. Sternaulus strongly impressed, reaching both anterior and posterior corner of mesopleurum. Lateral panels of propodeum polished. Fore-wing with areolet almost always distinctly 4-sided

(17 ex.); rarely almost triangular (4 ex.); apical abscissa of postmarginalis slightly more than 0·5 times longer than proximal abscissa. Hind femur decidedly thick, 2·5 times longer than widest part; outer side of middle tibia with 6–7 teeth; inner spur of hind tibia just reaching middle of basal segment of hind tarsus; hind claw with well-developed, somewhat pointed lobe.

Gaster rather short and broad; segment 1 markedly triangular, as long as wide apically, irregularly striate to striate-rugose all over. Ovipositor sheath short, not longer than gaster; bristle-like hairs of apical third of ovipositor sheath not, or hardly, different from those of middle third (Fig. 52).

MATERIAL EXAMINED

Belgium: 2 ♀, Wesmael coll. (IRSNB). **Bulgaria**: 23 ♀, Sh. poljana, 6–22.v.1976 (*Zaykov*) (ZC). **Great Britain**: 2 ♀, England, Buckinghamshire, vi–vii. (*Benson*) (BMNH). **Ireland**: 1 ♀, Antrim, Loch Neagh, 26.vi.1967 (*Stelfox*) (USNM); 1 ♂, 1 ♀, Dublin, Glenasmole, 24.vi.1938 (*Stelfox*) (USNM). **Turkey**: 1 ♀, Edirne, 8.v.1960 (*Guichard & Harvey*) (BMNH). **Yugoslavia**: 1 ♀, Slovenia, Kropa (*Ward*) (BMNH).

HOST. Unknown.

COMMENTS. This species is fairly easy to recognise on the combination of short galea and unusually short ovipositor sheath. In his description Nees draws special attention to the latter feature.

Agathis assimilis Kokujev

(Figs 2, 19, 25)

Agathis assimilis Kokujev, 1895: 387. Holotype ♀, U.S.S.R. (AS) [not examined].

Tobias (1963: 878) examined the type of *assimilis* which, he says, is badly damaged, lacking wings, legs (except one hind leg) and antennal tips. Specimens determined by him as *assimilis* have been received on loan at BMNH; his interpretation of Kokujev's species is accordingly accepted.

♀. Closely related to *breviseta* on the structure of the frons (Fig. 19) and the shortness of the galea. It may be compared with that species as follows.

Colour similar. Head in facial view (Fig. 2); seen from above, slightly more transverse, less produced backwards behind eyes (Fig. 25); this is correlated with a slightly lower ocellar triangle. Antenna thinner, filiform; two apical segments relatively a little longer; 28–31-segmented; flagellum considerably more bristly. Sternaulus reaching posterior margin of mesopleurum but not anterior margin. Areolet of fore-wing variable to same degree; apical abscissa of postmarginalis slightly longer. Legs more slender; hind femur about 3 times longer than wide; segment 3 of hind tarsus relatively a little longer; outer side of middle tibia with 4–5 teeth, arranged more or less in row; inner spur of hind tibia slightly shorter, relative to length of basal segment of hind tarsus. Tergite 1 slightly narrower, more shiny because of reduction in strength of sculpture; this vaguely coriaceous, with some weak striation on basal half. Ovipositor sheath much longer, about equal to propodeum plus gaster; as in *breviseta*, the apical, bristle-like hairs of the sheath are not differentiated from the rest.

MATERIAL EXAMINED

Bulgaria, Great Britain.

HOST. Unknown.

COMMENTS. This species and *breviseta* evidently form a small species-group characterised by the curious formation of the inter-antennal keel, combined with the deep, narrow cavity in front of the anterior ocellus. The long, filiform antenna and the longer ovipositor readily distinguish *assimilis* from *breviseta*.

One ♀ examined (Great Britain: Scotland, The Birks, Aberfeldy, 26.vii.1954 (*Stelfox*) (BMNH)) has the propodeum rugulose and dull almost all over.

Agathis fulmeki Fischer

(Figs 10, 35, 42, 51)

Agathis fulmeki Fischer, 1957*b*: 6. Holotype ♀, AUSTRIA (NM) [examined].

♀, *ca* 3·5 mm long (excluding ovipositor). Black. Apical four segments of maxillary palpus almost always yellowish and in contrast with black labial palpus. Hind femur black; hind tibia without, or virtually without, a dark basal ring.

Head in facial view short, subtriangular (Fig. 10). Longer diameter of eye 2·5 times longer than malar space. Surface between antennal insertions raised and ridge-like where it joins depression in front of anterior ocellus; this depressed area V-shaped, not deep, slightly domed at middle. Galea smooth, shiny, 2·5 times longer than wide; labial palpus unusually long (Fig. 51). Clypeus largely polished, bare. Antenna with 25–27 segments; two preapical segments of flagellum hardly longer than wide. Thorax in profile elongate (Fig. 42), about twice as long as wide. Mesoscutum strongly shining, not densely hairy and often with vague punctuation, mostly on middle lobe. Notaulices sharply defined but not deep, distinctly foveate. Sternaulus short, shallow, sometimes almost obliterated and not reaching either posterior or anterior margin of mesopleurum. Areolet of fore-wing triangular or almost so; distal abscissa of post-marginalis hardly shorter than proximal abscissa. Legs rather thick; outer side of middle tibia with 6–7 teeth (Fig. 35); hind femur about 2·5 times longer than wide; inner spur of hind tibia just reaching middle of basal segment of hind tarsus; hind claw with conspicuous lobe, large, strongly bent and with deep cleft between itself and claw proper. Tergite 1 slightly longer than wide at apex, shiny, with faint traces of rugosity and weak indication of striation laterally. Ovipositor sheath about as long as gaster plus propodeum; seen from above, hairs of distal, slightly widened part of sheath considerably shorter and less noticeable than those proximal to it.

MATERIAL EXAMINED

Austria: 1 ♀ (holotype), Mödling-Vorderbrühl (NM). **Bulgaria**: 48 ♀, Rhodopi, vi–vii. (*Zaykov*) (ZC; 17 ♀ in BMNH).

COMMENTS. A most distinctive species, recognisable on combination of narrow thorax, short head and teeth on outer side of middle tibia. It differs from *breviseta* and *assimilis* in that the galea is longer and the decoration of the frons, though basically similar, has no knife-like edge between the antennal insertions.

Agathis rufipalpis Nees von Esenbeck

(Figs 17, 36)

Agathis rufipalpis Nees von Esenbeck, 1814: 192. Syntypes, GERMANY (lost).

Wesmael (1837: 24) was the first reviser of Nees von Esenbeck's species; I have based my interpretation of *rufipalpis* on specimens in Wesmael's collection bearing his handwritten identification label.

This species is extremely like *fulmeki*, differing from it only in the following characters.

♀. Four apical segments of maxillary palpus sometimes paler than labial palpus.

Head in facial view slightly more elongate (Fig. 17). Longer diameter of eye about 1·75 times longer than malar space. Clypeus hairy all over. Depression in front of anterior ocellus more narrowly V-shaped. Antenna with 24–28 segments. Thorax in profile slightly less elongate (Fig. 36). Sternaulus equally short and weak. Outer side of middle tibia with 7–9 similarly thick teeth; inner spur of hind tibia distinctly less than half as long as basal segment of hind tarsus. Tergite 1 more distinctly sculptured and with somewhat broken striation almost all over. Ovipositor sheath about as long as gaster plus thorax.

MATERIAL EXAMINED

Belgium: 5 ♀, Brussels (1 ♀ BMNH, rest IRSNB). **Bulgaria**: 10 ♀, Rhodopi, vi.–vii. (*A. Zaykov*) (ZC). **Ireland**: 1 ♂, Wexford, Curracloe, vii. (BMNH). **Sweden**: 1 ♀, Solna, viii.1976 (*T. Huddleston & J. Quinlan*) (BMNH).

HOST. Unknown.

COMMENTS. This species is very much like *fulmeki* and the two should always be considered together. It differs from *breviseta* and *assimilis* by the same characters as those which separate these species from *fulmeki*.

Agathis varipes Thomson

(Figs 16, 50)

Agathis varipes Thomson, 1895: 2228. LECTOTYPE ♀, SWEDEN (ZI), here designated [examined].

♂ ♀, 5·0–5·5 mm long (excluding ovipositor).

♀. Black. Gaster tending to be brownish. Hind femur varying from mostly black to entirely brownish red (1 ♀, Italy).

Head in facial view subtriangular (Fig. 16). Impression in front of anterior ocellus variable in definition; sometimes sharply U-shaped and jutting forwards as though on a prominence; sometimes showing merely as a U-shaped, margined depression (in the related *tibialis*, this depression tends to be V-shaped). Ocelli in a rather low triangle. Malar space 0·66 times as long as longer diameter of eye. Galea rather short, shorter than in related *tibialis*, 2·25–2·33 times longer than wide, not longer than malar space. Antenna with 23–26 segments: 23(2), 24(5), 25(1), 26(1). Thorax in profile somewhat elongate, fully 1·5 times longer than wide seen in profile. Notaulices somewhat variable in definition; in one bred male (Surrey, Effingham), they are hardly indicated. Sternaulus usually not reaching posterior corner of mesopleurum. Medial, longitudinal keels of propodeum sharply defined; lateral panels extensively polished. Areolet of fore wing usually sharply triangular; radial cell rather long (Fig. 50); distal abscissa of postmarginal is usually distinctly more than half as long as proximal abscissa. Outer side of middle tibia with 2–5 teeth arranged more or less in a row; hind claw with strong, well-defined lobe; inner spur of hind tibia not quite reaching middle of basal segment of hind tarsus. Gaster on the whole having a smooth, highly polished appearance. Basal half of tergite 1 sometimes with indication of weak rugosity. No trace of sculpture posterior to the hardly indicated basal swelling on tergites 2+3. Ovipositor sheath about as long as body.

♂. Two preapical segments of antenna fully 1·5 times longer than wide; whole antenna considerably longer than in *tibialis*. Hind femur much less thickened (cf. Fig. 33), infuscate but sometimes reddish towards apex.

MATERIAL EXAMINED

Germany: 2 ♀, 2 ♂, no locality, ex *Metzneria lappella* (L.) (BMNH); 1 ♀, Goslar, Grauhöfer, 10.viii.1944 (*Bauer*) (EH). **Great Britain**: 1 ♀, Devon, E. Bovey, viii (*Perkins*) (BMNH); 2 ♀, 1 ♂, Hampshire, Farley Mount, vi–vii., ex *Myelois cirrigerella* (Zincken) (*Fassnidge*) (BMNH); 1 ♀, Hertfordshire, Tring, vii (*Benson*) (BMNH); 1 ♀, Kent, Erith, swept from *Achillea* (*Ford*) (BMNH); 1 ♂, Cambridgeshire, Wicken Fen, 9.vii.1982, ex microlepidopteron collected 16.iv.1982 on *Salix* (*Pitkin*) (BMNH); 2 ♀, 2 ♂, Surrey, Coulsdon, vii.1944, ex stems of *Arctium medius* (*Arctium ?lappa* L.) collected iii.1944 (*Britten*) (BMNH); 1 ♀, 3 ♂, Surrey, Effingham Common, vii.1946, ex *Metzneria lappella* (L.) collected iii.1946 (*Niblett*) (BMNH); 1 ♀, Surrey, Oxshott, vi. (*Billups*) (BMNH). **Sweden**: 1 ♀ (lectotype), Skåne, 'Fg' (= Fogelsang) (*Thomson*) (ZI); 1 ♀, Ringsjö (*Perkins*) (BMNH).

HOSTS. *Metzneria lappella* (L.) (Gelechiidae). *Myelois cirrigerella* (Zincken) (Pyralidae).

COMMENTS. This species and *tibialis* are very much alike, the only reliable difference being the shape of the antero-ocellar impression and the thickness of the hind tibia. *A. varipes* is slightly larger than *tibialis* but this may have little significance in the identification of single specimens. There is some overlap in the number of antennal segments.

Agathis anglica Marshall

(Figs 18, 49)

Agathis anglica Marshall, 1885: 265. Holotype ♀, GREAT BRITAIN (BMNH) [examined].
Agathis albanica Fischer, 1957*b*: 3. Holotype ♀, ALBANIA (NM) [examined]. **Syn. n.**

♂ ♀, 4·5–5·0 mm long (excluding ovipositor).

♀. Black. Hind femur entirely black; hind tibia yellowish on basal two-thirds, with dark basal band and blackened on apical two-fifths. Medius of fore-wing usually colourless throughout.

Head in facial view markedly elongate and considerably narrowed below eyes (Fig. 18); seen from above with face just out of view strongly transverse. Hardly a trace of a keel between antennal sockets and with at most a weakly impressed dimple in front of anterior ocellus. Malar space almost equal to longer diameter of eye, 13 : 15. Galea about 3·5 times longer than wide and about 1·5 times longer than malar space. Antenna with 26–29 segments, slightly tapered towards apex and with segment 4 from apex about 1·25 times longer than wide. Thorax in profile somewhat short and high. Notaulices deeply impressed. Propodeum with the usual two longitudinal keels and with polished, lateral panels. Sternaulus well defined, reaching posterior corner of mesopleurum. Radial cell short, broad (Fig. 49); aerolet markedly, characteristically 4-sided; distal abscissa of postmarginalis very short, 1·25–1·33 times as long as proximal abscissa. Outer side of middle tibia with 3–5 teeth arranged in a row; hind claw with at most a weakly angled projection at base. Tergite 1 rugose-striate all over. Tergites 2+3 with well-defined, transverse, basal, blister-like swelling; surface posterior to this swelling with a considerable amount of striation or rugose-striation. Ovipositor sheath nearly as long as body.

♂. Like female except for sexual differences. In nine examples from Turkey there is considerable variation in the definition of the impression in front of the anterior ocellus; sometimes it is relatively distinct; sometimes virtually absent; in all these examples the areolet of the fore-wing is very obviously 4-sided. Tergites 2+3 show much less rugosity than in the female and are sometimes virtually smooth.

MATERIAL EXAMINED

Albania: 1 ♀ (holotype of *albanica*), Kula Ljums (NM). **Austria**: 1 ♀, Achenkirch (*Haeselbarth*) (EH); 1 ♀, Fliess (*Haeselbarth*) (EH); 1 ♀, Nordkette, 3.vii.1947, ex *Epinotia mercuriana* (Frölich) (*Bauer*) (EH). **Bulgaria**: 1 ♀, Rhodopi, Aida, 5.vi.1976 (*Zaykov*) (ZC); 1 ♀, Popsko, 21.vi.1977 (*Zaykov*) (ZC); 1 ♀, Sh. poljana, 18.vi.1976 (*Zaykov*) (ZC); 1 ♀, Bojuo, 24.vii.1975 (*Zaykov*) (ZC). **Cyprus**: 27 ♀, Mavromoustakis coll. (BMNH); 1 ♀, Platres, 16.vi.1970 (*Gallagher*) (BMNH). **Great Britain**: 1 ♀ (holotype of *anglica*), Wales, Pembrokeshire, Milford Haven (BMNH); 1 ♀, England, Surrey, Hackhurst Downs, 28.viii.1982 (*Allen*) (AA). **Greece**: 1 ♀, 2 ♂, Rhodes, Ixia (*Day*) (BMNH). **Italy**: 1 ♀, Partschins, vii.1966 (*Haeselbarth*) (EH).

HOST. *Epinotia mercuriana* (Frölich) (Tortricidae).

COMMENTS. It is possible that the range of specific variation accepted here for *anglica* may be too wide and the material examined may form an aggregate. Nevertheless, all the specimens provisionally accepted as *anglica* have four rather striking features in common: the narrow head as seen from in front, the conspicuously 4-sided areolet of the fore-wing, the unlobed claws and the rugosity of the gaster.

Agathis tibialis Nees von Esenbeck

(Figs 33, 48, 53)

Agathis tibialis Nees von Esenbeck, 1814: 194. Syntypes, FRANCE (lost).

♂ ♀, *ca* 4 mm long (excluding ovipositor).

♀. Black with gaster usually brownish, especially tergites 2+3. Hind femur almost always bright brownish red but becoming flushed with darker colouring on basal half. Wings strongly darkened; medius of fore wing heavily brown throughout.

Head in facial view, short, subtriangular. Impression in front of anterior ocellus narrow, well defined and, when head seen in profile, not projecting beyond anterior ocellus; this elongate, margined impression united in front with sharp, strongly raised keel between antennal insertions. Galea nearly 3 times as long as wide, shining, polished, distinctly a little longer than malar space. Malar space shorter than longer diameter of eye. Antenna characteristically short, 21–22-segmented: 21 (8), 22 (3); four preapical segments of antenna only slightly longer than wide. Thorax in profile somewhat elongate, less than twice as long as wide, 20 : 13. Notaulices well defined. Sternaulus becoming somewhat indistinct before reaching posterior margin of mesopleurum. Propodeum highly polished on each side of the two longitudinal keels. Radial cell rather short, 5 times as long as wide; areolet of fore wing triangular to subtriangular, never obviously 4-sided; distal abscissa of postmarginalis fully 0·66 times as long as proximal abscissa; medius of fore-wing heavily sclerotised throughout. Hind femur much swollen (Fig. 33); inner spur of hind tibia much less than half as long as basal segment of hind tarsus (Fig. 53); hind claw with conspicuous lobe. Tergite 1 polished and virtually smooth over most of apical half; vaguely rugose-striate on posterior half; sometimes faint scaly-reticulation present on apical, polished surface. Rest of gaster highly polished and shining. Ovipositor distinctly a little longer than body.

♂. Like female in having thickened, predominantly reddish hind femur. Antenna characteristically shorter than body, 21–23-segmented: 21 (6), 22 (7), 23 (1); two preapical segments about 1·33 times as long as wide.

MATERIAL EXAMINED

Great Britain: 13 ♀, 28 ♂, Devon, Dawlish Warren (*Allen*) (AA); 1 ♀, Devon, Braunton Burrows, vii (*Allen*) (AA); 1 ♀, Devon, Heathfield, viii (*Allen*) (AA); 1 ♀, Dorset, Portland, collected from seed-head of *Centaurea nigra* L. (*Hall*) (BMNH); 2 ♀, Cambridgeshire, Wicken Fen, ex seed-head of *Pulicaria dysenterica* L., collected 29.xiii.1975, emerged 1976 (host either *Apodia bifractella* Douglas or *Ptocheuusa paupella* Zeller) (*Emmet*) (BMNH); 4 ♀, 3 ♂, Surrey, Banstead, ex *Aristotelia bifractella* Douglas in flower-heads of *Inula squarrosa* L., collected ix.1946, emerged viii.1947 (*Niblett*) (BMNH); 25 ♀, 25 ♂, Surrey, Salfords, viii (*Allen*) (AA); 4 ♀, 21 ♂, Sussex, Hailsham (*Ford*) (BMNH). **Holland**: 1 ♀, Terschelling, near Rijsplak, 14.vii.1967 (*Pronk*) (RNH); 2 ♀, Terschelling, dunes near Doodemauskisten, 6.vii.1967 (*Pronk*) (RNH).

HOSTS. *Apodia bifractella* (Duponchel) (Gelechiidae) and possibly *Ptocheuusa paupella* (Zeller) (Gelechiidae), both feeding in flower-heads of *Pulicaria dysenterica* L.

COMMENTS. The data indicate that this species flies from July to September, but mainly in August, and apparently is not uncommon where it occurs. What characterises the species essentially are the much thickened, red-flushed hind femur, the short antenna in both sexes, the narrow, rather low, margined impression in front of the anterior ocellus, and the sharp interantennal keel.

Agathis malvacearum Latreille

(Figs 4, 26)

Agathis malvacearum Latreille, 1805: 175. Holotype ♀, FRANCE (lost).

♂, ♀, 5–7 mm long (excluding ovipositor).

♀. Black with tergites 1 and 2+3 largely bright yellowish red. Hind femur reddish yellow; middle and front femora reddish yellow but touched with black at base.

Head in facial view strongly elongate (Fig. 4), eyes strongly bulging; seen from above, strongly produced backwards behind eyes (Fig. 26). In profile a conspicuous bulge in region of temples. Malar space very slightly shorter than longer diameter of eye, 16:17. Galea about 2·25 times longer than wide, distinctly a little longer than malar space. Antenna with 21–32 segments. Between antennal insertions a fairly sharp keel that unites above with a deep U-shaped cavity in front of anterior ocellus. Thorax of ordinary form. Notaulices deeply impressed. Sternaulus strongly defined, reaching posterior corner of mesopleurum. Side of pronotum anterior to oblique trough polished and with hardly a trace of sculpture. Radial cell rather long; areolet distinctly 4-sided in material available; distal abscissa of postmarginalis slightly more than 0·5 times as long as proximal abscissa. Outer side of middle tibia with 2–5 teeth arranged more or less in a row; inner spur of hind tibia not quite reaching middle of basal segment of hind tarsus; hind claw with dentiform, basal lobe; cleft between lobe and claw proper not particularly deep. Tergite 1 becoming smooth, polished on about apical one-third; elsewhere with fairly distinct striation. Tergites 2+3 polished, unsculptured. Ovipositor sheath about as long as body.

♂. Like female in having tergites 2+3 brightly coloured; a single example from Corsica (BMNH) has the mesoscutum as brightly reddish as the base of the gaster but each of the three lobes is suffused with infuscation; a single male from Bulgaria, Rhodopi, (ZC) has the mesoscutum entirely reddish.

MATERIAL EXAMINED

Bulgaria: 1 ♀, Rhodopi, Petelovo, vii (*Zaykov*) (ZC). **France**: 1 ♂, Basses Alpes, Digne, vi. (*Slob*) (RNH); 2 ♂, 2 ♀, Bretagne, Pres'île de Rhuys, Kerfontaine, 1976, on *Malva* sp. (*Doesberg*) (RNH); 1 ♂, Corsica, vii. (BMNH). **Greece**: 1 ♀, Drosia, 4.vi.1957 (*Mavromoustakis*) (BMNH); 1 ♀, Kerfissos, 8.vi.1957 (*Mavromoustakis*) (BMNH); 1 ♀, Epidavros, vi. (*Mound*) (BMNH). **Turkey**: 1 ♀, Mersin, Servatul Gecidi (*Guichard & Harvey*) (BMNH).

HOST. *Pexicopia malvella* (Hübner) (Gelechiidae).

COMMENTS. Tobias (1964) emphasises the colour variability of this species on the basis of series bred from the Mallow moth in Armenia. He points out that autumnal specimens are darkest in colour while summer forms emerging in August and September are lighter with tergites 1–3 red and the hind femur also reddened. He also considers (1963: 876) that darker examples of *malvacearum* agree with the original description of *tibialis* Nees von Esenbeck as well as with the interpretation of this latter species accepted by earlier authors. He accordingly suggests that *tibialis* Nees von Esenbeck may be a synonym of *malvacearum* Latreille. But in the absence of formal synonymisation I prefer to use the name '*tibialis* Nees von Esenbeck' for a species that agrees better with Nees von Esenbeck's original description than any variety of *malvacearum*.

The bulging temples of *malvacearum* are its most characteristic feature and the head in consequence appears strongly produced backwards behind the eyes when seen from above.

Agathis griseifrons Thomson

(Fig. 44)

Agathis griseifrons Thomson, 1895: 2227. LECTOTYPE ♀, SWEDEN: (ZI), here designated [examined].
Agathis laticarpa Telenga, 1955: 255. Holotype ♀, U.S.S.R.: Ukraine, Chernogavskaya Oblast (AS) [not examined]. **Syn. n.**

♂ ♀, 4·8–5·5 mm long (excluding ovipositor). Black. Legs predominantly reddish but colour variable; hind femur often entirely reddish but sometimes darkened on basal half, more rarely with infuscation extending along whole of upper surface; hind tibia often markedly yellowish, infuscate on about apical third, with a darkened basal ring.

♀. Head in facial view obviously elongate. Malar space fully two-thirds as long as longer diameter of eye, 11 : 15. Galea as long as malar space. Face densely clothed with greyish or pale brownish pubescence. No trace of a keel between antennal insertions and virtually no impression in front of anterior ocellus. Antenna with 31–33 segments: 31 (1), 32 (8), 33 (3); flagellum rather finely tapered towards apex. Thorax in profile short and of generalised appearance. Side of pronotum anterior to the oblique trough usually very coarsely rugose. Notaulices deeply impressed. Sternaulus strongly developed, reaching posterior corner of mesopleurum. Areolet of fore-wing distinctly 4-sided; distal abscissa of postmarginalis about 0·33 as long as proximal abscissa. Hind claw with pale, dentiform lobe at base (Fig. 44); outer side of middle tibia with 1–3 teeth arranged in a row. Gaster of ordinary form. Tergite 1 about as long as apically wide, striate-rugose all over. Frequently a certain amount of striation to side of, and apical to, transverse, blister-like, posterior swelling. Ovipositor sheath about as long as gaster plus thorax.

♂. Like female except for sexual differences. Antenna very long, tapered apically, 29–32-segmented; segment 8 from apex twice as long as wide. Usually more brightly coloured than female with apical four segments of maxillary palpus entirely yellowish. Tooth at base of hind claw often hardly developed.

MATERIAL EXAMINED

Bulgaria: 1 ♀, Rhodopi, Gabrovo, viii. (*Zaykov*) (ZC). **France**: 1 ♂, Beaune, ex *Pyrausta aurata* Scopoli on *Mentha aquatica* L. (BMNH); 1 ♀, Nantua, Marshall coll. (BMNH). **Great Britain**: 1 ♀, 1 ♂, Kent, Bexley, bred viii.1952 ex *Pyrausta aurata* Scopoli (*Ford*) (BMNH); 3 ♀, Surrey, Bletchworth, 23.viii.1983 (*Allen*) (AA); 1 ♀, Clandon Downs, vi. (*Perkins*) (BMNH); 1 ♂, 1 ♀, Boxhill, vi. (*Perkins*) (BMNH). **Greece**: 1 ♀, Philippi, v. (*Guichard & Harvey*) (BMNH). **Holland**: 1 ♀, Maastricht, vi. (*Lefebe*) (RNH); 2 ♀, Asperen, vi.–viii. (*Zwakhals*) (RNH). **Ireland**: 1 ♂, 1 ♀, Woodbrock, vi. (*Stelfox*) (USNM); 1 ♀, Wicklow, Athdown, vii. (*Stelfox*) (USNM). **Italy**: 2 ♂, 1 ♀, Naples, viii. (*Osborne*) (BMNH). **Poland**: 2 ♀, Tatra Mts, Zakopane, vi. (*Aubertin*) (BMNH). **Sweden**: 6 ♀, Skåne, 'sand-dunes' (ZI); 1 ♀ (lectotype), Skåne, labelled 'griseifrons' and 'coll. L-gh' (ZI).

HOST. *Pyrausta aurata* (Scopoli) (Pyralidae).

COMMENTS. In one of the two females from Holland, Asperen, tergite 1 is almost smooth over most of the apical half, and the dark ring at the base of the hind tibia is joined to the infuscate area at the apex of the tibia by a broad band of infuscation.

Agathis griseifrons is largely characterised by the absence of a keel between the antennal insertions, the virtual absence of any impression in front of the anterior ocellus, the dense pubescence of the face and the usually predominantly red-marked hind femur. Having a rugose first tergite, it is at once different from the superficially similar *tibialis* and *varipes*.

Agathis nigra Nees von Esenbeck

(Figs 11, 38, 45)

Agathis nigra Nees von Esenbeck, 1814: 191. Syntypes, GERMANY (lost).
Agathis testaceipes Fischer, 1957*b*: 8. Holotype ♀, AUSTRIA (NM) [examined]. **Syn. n.**

Wesmael (1837: 23) was the first reviser of Nees von Esenbeck's species; I have based my interpretation of *nigra* on specimens in Wesmael's collection bearing his handwritten identification label.

♂ ♀, 4·5–4·8 mm (excluding ovipositor). Black, rarely tergites 2+3 reddish (1 ♀, Yugoslavia). Hind femur reddish but flushed with infuscation on basal half; almost entirely reddish in 2 ♀ from Yugoslavia.

♀. Head in facial view not strongly elongate (Fig. 11). Malar space distinctly shorter than longer diameter of eye, 9 : 13. A weak or vestigial keel between antennal insertions. A more or less distinct V-shaped impression in front of anterior ocellus. Mouth parts very long; when fully extruded distinctly longer than head; galea fully 4 times as long as wide, tapering to a fine point. Antenna 23–25-segmented: 23 (4), 24(2), 25 (4); two preapical segments about 1·33 times longer than wide. Thorax in profile markedly elongate (Fig. 38). Mesoscutum having a black, shiny appearance owing to sparseness of pubescence. Notaulices varying much in definition but usually weakly defined, at least anteriorly; virtually absent in 1 ♀ (Yugoslavia, Korab Mts); frequently obliterated in posterior half in other females. Sternaulus usually reaching posterior corner of mesopleurum, rarely fading out before this. Propodeum showing a slight peculiarity in that each lateral panel shows on its dorsal surface a broad, transverse band of very coarse rugosities. Areolet of fore-wing always very obviously triangular; in two females even with short stalk; distal abscissa of postmarginalis almost as long as proximal abscissa. Inner spur of hind tibia falling far short of middle of basal segment of hind tarsus; outer side of middle tibia with 1–3 teeth arranged more or less in a row; in one female without teeth; hind claw with at most a small projection at base (Fig. 45). Gaster highly polished; tergite 1 virtually without trace of sculpture. Ovipositor sheath about as long as body.

♂. Like female except for sexual differences. Antenna with 23–24 segments; flagellum very thin, thread-like, the two preapical segments almost twice as long as wide.

MATERIAL EXAMINED

Austria: 1 ♀ (holotype of *testaceipes*), Burgenland, Schützen, 10.vii.1941 (*Fulmek*) (NM). **Belgium**: 7 ♀, 6 ♂, viii. (*Crevecoeur*) (IRSNB); 1 ♂, Brussels, Wesmael coll. (IRSNB). **Germany**: 1 ♀, Mecklenburg (*Konow*) (BMNH). **Yugoslavia**: 1 ♀, Korab Mts, Stirovica, viii. (*Martino*) (BMNH); 1 ♀, Nicpur, vii. (*Martino*) (BMNH).

HOST. Unknown.

COMMENTS. This is one of the more distinct species, largely characterised by the much lengthened galea, absence of lobe on hind claw and especially by the almost obliterated notaulices. The two other species with long galea included in this revision are *taurica* and *zaykovi*, but both can easily be separated from *nigra*.

A single female from Spain: Navarra, Peralta (*Achterberg*) (RNH) may possibly represent a further species. In all important respects it resembles *nigra* – short head and absence of lobe on hind claw – but the galea is longer, nearer to six times longer than basal width, and the notaulices are sharply defined. I have labelled this specimen as '? *nigra* Nees or sp. n.'.

Agathis zaykovi sp. n.

(Figs 7, 34, 47)

♂ ♀, *ca* 4 mm (excluding ovipositor). Black. Hind femur black throughout.

♀. Head in facial view considerably lengthened (Fig. 7). Malar space 0·66 times as long as longer diameter of eye. Between antennal insertions virtually no trace of a keel. A weak, vague V-shaped impression, sometimes almost obliterated, in front of anterior ocellus. Galea tapered towards apex but not so evenly as in *nigra*, about 3·5 times longer than its basal width (Fig. 34). Antenna with 26–27 segments; 26 (8), 27 (4); apical 5–6 segments of flagellum somewhat tapered; two preapical segments hardly longer than wide. Thorax in profile somewhat elongate but less so than in *nigra* (cf. Fig. 38). Notaulices costate, deeply impressed throughout. Sternaulus strongly defined, costate throughout and reaching posterior corner of mesopleurum. Areolet of fore-wing usually slightly narrowed above but always distinctly 4-sided; distal abscissa of postmarginalis hardly shorter than proximal abscissa. Hind claw with large lobe (Fig. 47); outer side of middle tibia with 6–9 teeth, some of then paired, and forming an irregular row; inner spur of hind tibia not quite reaching middle of basal segment of hind tarsus. Gaster of generalised form and broader than in *nigra* (Fig. 40). Tergite 1 with vague traces of rugosity across brow, lacking the highly polished appearance of *nigra*. Ovipositor sheath as long as gaster plus thorax.

♂. Antenna almost as long as that of *nigra* from which it is distinguished by the structure of the claws.

MATERIAL EXAMINED

Holotype ♀, **Bulgaria**: Rhodopi, Theigovsharu, 9.viii.1979 (*A. Zaykov*) (ZC).

Paratypes. 12 ♀, same data (ZC; 4 in BMNH).

Non-paratypic material **Bulgaria**: 3 ♂, Rhodopi, Theigovsharu, 9.viii.1979; 3 ♂, Stointe, 4.viii.1978 (*A. Zaykov*) (ZC). **Greece**: 6 ♀, 8 ♂, Macedonia, Korab Mts, Stirovica, 27.vii.–3.viii. (*V. Martino*) (BMNH).

HOST. Unknown.

COMMENTS. The length of the galea together with the relatively large number of teeth on the outer side of the middle tibia make *zaykovi* distinct from all other included species that have a generalised gastral shape. The strongly lobed claws at once separate it from *nigra* to which it may not be closely related in spite of the lengthened galea.

Agathis taurica Telenga

Agathis taurica Telenga, 1955: 260. Lectotype ♀, U.S.S.R. (AS) designated by Tobias [not examined].

My interpretation of this species is based on a paralectotype ♂ received on loan from AS. I have been unable to discover where, or indeed whether, the lectotype designation was published.

♀, 5 mm (excluding ovipositor). Like *zaykovi* in having hind claw with strong lobe though this is slightly less well developed than in *zaykovi*; *taurica* may be compared with *zaykovi* as follows.

Antenna with 25 segments (Telenga gives 24 segments for the female). Head in facial view like *zaykovi* (cf. Fig. 7). Mouth-parts longer; galea tapering to fine point, six times as long as basally wide. Head from above slightly less transverse and less emarginate behind. Thorax in profile slightly less elongate.

Notaulices deeply impressed but smooth throughout. Virtually no trace of a sternaulus. Areolet of fore-wing distinctly 4-sided but slightly narrower; distal abscissa of postmarginalis slightly shorter in relation to proximal abscissa. Outer side of middle tibia with broad band of close, densely placed teeth, about 23 (only 1 ex.!); inner spur of hind tibia about 0·33 times as long as basal segment of hind tarsus. Gaster a little longer and narrower. Tergite 1 a little longer than its apical width, shining and with vague traces of sculpture across brow. Ovipositor sheath about as long as gaster plus thorax.

MATERIAL EXAMINED

Turkey: 1 ♀, Amasya, 1400 ft, 6.vi.1959 (*Guichard*) (BMNH). **U.S.S.R.**: 1 ♂ (paralectotype), Tauria, Simferopol (*Pliginskij*) (AS).

HOST. Unknown.

COMMENTS. As far as is known this species is not part of the main European fauna and has an eastern Mediterranean distribution. Among the species under review it is the third with greatly lengthened mouth-parts. It is distinct from the other two species – *nigra* and *zaykovi* – with much lengthened galea (and indeed from all other included species) on the dense band of teeth on the outer side of the middle tibia. Telenga (1955) records *taurica* from Simferapol and Sevastopol; Tobias (1976) records it from the Crimea and Armenia.

Agathis semiaciculata Ivanov

(Figs 13, 43)

Agathis semiaciculata Ivanov, 1899: 364. Syntypes, U.S.S.R. (lost).

♂ ♀, 4·5–5·5 mm (excluding ovipositor). Black. Hind femur black throughout; middle and front femora blackish on at least basal half.

♀. Head in facial view only moderately elongate (Fig. 13). Malar space very slightly shorter than longer diameter of eye, 13 : 15. Galea rather short, distinctly shorter than malar space, slightly more than 2·5 times longer than wide. Antenna thin, of even thickness throughout, 26–28-segmented: 26(2), 27 (1), 28 (1). Face almost as thickly pubescent as in *griseifrons* and in two out of four females with distinct traces of striate-punctation. Virtually no keel between antennal insertions and no depression in front of anterior ocellus. Thorax in profile of generalised shape. Notaulices deeply impressed. Side of pronotum anterior to oblique trough as coarsely rugose as in *griseifrons*. Sternaulus strongly developed, reaching posterior corner of mesopleurum. Areolet of fore-wing a little narrowed above but distinctly 4-sided; distal abscissa of postmarginalis hardly half as long as proximal abscissa. Propodeum with the usual, two longitudinal keels, sometimes obscured by surrounding rugosities. Outer side of middle tibia with 1–2 teeth, difficult to see because of infuscation of tibia; hind claw with small tooth at base but no deep cleft between it and claw proper (Fig. 43); hind claws longer and more powerfully built than in *griseifrons*; inner spur of hind tibia well developed, two-fifths as long as basal segment of hind tarsus. Tergite 1 hardly longer than its apical width, closely, evenly striate all over; striation tending to be broken and confused at middle of segment. Basal half of tergites 2+3 closely striate all over, the striation tending to be concentric around basal, transverse swelling. Ovipositor sheath almost as long as body.

♂. Like female except for sexual characters. Antenna with 26–28 segments: 26 (1), 27 (2), 28 (2). Definition of basal tooth of hind claw variable; sometimes represented by a mere projection or angulation. Sculpture of basal half of tergites 2+3 tending to be broken down to intricate rugose-striation.

MATERIAL EXAMINED

Italy: 1 ♀, Bolzano, Seiser-Alm., 1900 m, 24.vi.1976 (*Zwakhals*) (RNH). **Switzerland**: 2 ♂, 3 ♀, Arolla, 7000–8000 ft, 29–30.vi.1935 (*Benson*) (BMNH); 1 ♀, Valais, Les Haudères, vi.1935 (*Benson*) (BMNH); 1 ♂, 1 ♀, Müstairtal, 2400 ft, vi.–vii.1960 (*Benson*) (BMNH); 1 ♂, 1 ♀, Saas-Fee, 7000–8000 ft, 25.vi.1962 (*Benson*) (BMNH).

HOST. Unknown.

COMMENTS. This species has a fairly close affinity with *griseifrons* from which it can at once be separated on the sculpture of the gaster. On the basis of the available material, it seems to be an alpine species. According to Telenga (1955) it is wide-spread in south-western regions of the U.S.S.R. with a range extending to northern Mongolia.

No other species in this revision has such extensive sculpture on tergites 2+3 though there is sometimes a weak approach to this condition in *anglica*. The head in facial view is hardly different from that of *griseifrons* though slightly wider towards the mouth; also, *griseifrons* has a distinctly tapered flagellum.

Agathis polita sp. n.

(Figs 8, 23)

♀, 4–5 mm (excluding ovipositor). Black with no trace of paler colouring on gaster. Wings almost hyaline.

Head in facial view markedly elongate and considerably constricted beneath eyes (Fig. 8); seen from above, considerably prolonged backwards behind eyes (Fig. 23). A sharp keel between antennal insertions unites above with a fairly distinct, V-shaped cavity in front of anterior ocellus. Antenna long, thin with 26–27 segments. Galea rather broad, not tapered to apex and distinctly a little longer than malar space, 5 : 4, and 2·5 times longer than wide. Thorax in profile markedly elongate. Notaulices at first sight wanting, indicated by barely visible, linear impressions. Sternaulus represented by short, hardly impressed line. Propodeum appearing highly polished, its twin keels virtually obliterated. Areolet of forewing triangular in holotype, distinctly 4-sided in paratype; distal abscissa of postmarginalis hardly shorter than proximal abscissa. Outer side of middle tibia with 8–9 irregularly spaced teeth; inner spur of hind tibia much less than half as long as basal segment of hind tarsus; hind claw with prominent lobe. Gaster decidedly narrow. Tergite 1 about 1·33 times longer than apically wide, smooth, polished. Ovipositor sheath a little shorter than head plus thorax.

Material examined

Holotype ♀, **Jordan**: Zerkatal, b. Romana, 200 m, 11.iv.1959 (*J. Klapperich*) (HNHM).

Paratype. 1 ♀, same data (BMNH).

Host. Unknown.

Comments. This is an extra-limital species and strictly has no place in this revision. It is included, however, because being virtually without notaulices it allows the following species, *persephone*, to be defined with more accuracy.

Agathis persephone sp. n.

♂ ♀, 5·5–6·0 mm (excluding ovipositor). Black with no hint of paler colouring on gaster. Hind femur black.

♀. Head in facial view short, subtriangular; from above, hardly distinguishable from that of *polita* (cf. Fig. 23). Keel between antennal insertions weak to almost absent. In front of anterior ocellus a fairly well-defined, somewhat projecting, V-shaped cavity. Galea rather short, twice as long as wide, hardly as long as malar space, 10 : 11. Antenna long, somewhat tapered towards apex, 25-segmented. Thorax in profile considerably elongate, almost twice as long as wide, 9 : 5. Mesoscutum without trace of notaulices. Mesopleurum with very short, weak sternaulus, separated from posterior corner of mesopleurum by fully its own length. Areolet of fore-wing triangular, with distinct basal stalk (1 ex.!); distal abscissa of postmarginalis fully 0·66 times as long as proximal abscissa. Outer side of middle tibia with 4 teeth, the two apical ones not easy to see because of infuscation of tibia; inner spur of hind tibia much less than half as long as basal segment of hind tarsus; hind claw with pale, angular projection rather than lobe. Side panels of propodeum in far greater part smooth, polished. Gaster beyond tergite 1 decidedly long, narrow; tergite 1 slightly longer than apically wide with vague rugosity towards sides but virtually smooth across apical third. Ovipositor sheath fully as long as body.

♂. Like female but head, seen from above, slightly more produced backwards behind eyes. Antenna 26–27-segmented. Sternaulus absent in one example, hardly indicated in the other. Areolet of fore-wing triangular.

Material examined

Holotype ♀, **France**: Aspin, 680 m, 5.vii.1951 (*H. Teunissen*) (RNH).

Paratypes. **France**: 1 ♂, Dordogne, Sarlat, 4.vi.1975 (*D. C. Geijsked*) (RNH); 1 ♂, Figeac, vi.1977 (*H. Teunissen*) (BMNH).

Host. Unknown.

Comments. This species is distinct because it lacks notaulices. The short head, in facial view, together with the ornamentation of the frons, suggests a probable relationship with *varipes*.

Agathis ariadne sp. n.

(Fig. 1)

♂ ♀, *ca* 4·5 mm (excluding ovipositor). Black. Gaster with no trace of red colour on tergites 2+3.

Mandibles deep yellow; in the single female (holotype) labrum also deep yellow. Except for weak, basal infuscation, hind femur bright reddish yellow in holotype and two out of three males.

♀. Head in facial view moderately elongate, wide across clypeus (Fig. 1), appearing very black and shiny, especially across clypeus owing to sparsity of pubescence. A well-defined keel between antennal insertions and a fairly deep, V-shaped impression in front of anterior ocellus. Galea about 3 times as long as its basal width and 1·5 times longer than malar space. Antenna thin, rather short, not tapering towards apex, 26-segmented. Thorax in profile somewhat elongate. Notaulices well defined. Sternaulus short, deep, not reaching posterior corner of mesopleurum. Side panels of propodeum polished except towards antero-lateral corner. Areolet of fore-wing almost triangular; distal abscissa of postmarginalis about 0·5 times as long as proximal abscissa; radial cell rather long, much as in *varipes* (cf. Fig. 50). Outer side of middle tibia with 5 teeth arranged more or less in row; inner spur of hind tibia reaching virtually middle of basal segment of hind tarsus; hind claw with strong lobe. Gaster of generalised form. Tergite 1 only slightly longer than its apical width and with only a very weak indication of sculpture. Ovipositor sheath about as long as gaster plus propodeum; hairs of sheath very bristly, those in apical fifth hardly different from those proximal to it.

♂. Like female except for sexual differences. Antenna with 23–24 segments, long, rather thin. In one male, tergite 6 is fully extruded and shows at base a specialised area (? sex gland), from which arise two pencils of hairs.

MATERIAL EXAMINED

Holotype ♀, **Czechoslovakia**: Szlovák, Erchs, Selmecbánya, 600 m, 22.vii.1976 (*J. Papp*) (HNHM).
Paratypes. 3 ♂, same data (HNHM, one in BMNH).

HOST. Unknown.

COMMENTS. This species certainly has some affinity with *varipes* but differs in the ornamentation of the frons and in having face much widened below. The virtually undifferentiated bristles towards the apex of the ovipositor sheath provide an additional, useful character for the recognition of *ariadne*.

The existence of what could be a sex gland at the base of the 6th tergite in the male needs to be investigated in detail; no similar structure is apparent in any of the males of *varipes*.

Agathis anchisiades sp. n.

(Figs 6, 22)

♀, *ca* 4·5 mm long (excluding ovipositor). Black. Gaster with no hint of paler colouring on tergites 2+3. Hind femur blackish with a small suffusion of paler colouring at extreme apex; hind tibia obscurely reddish yellow, infuscate in apical two-fifths and virtually with no trace of a darkened prebasal ring.

Head in facial view characteristically elongate (Fig. 6); from above rather strongly produced backwards behind the rather large eyes (Fig. 22). A sharp keel between antennal insertions and a distinct, narrow, V-shaped cavity in front of anterior ocellus. Antenna long, tapering, 29-segmented. Galea a little shorter than malar space, slightly more than 2·5 times longer than wide. Malar space two-thirds as long as longer diameter of eye. Thorax in profile rather short, of generalised form. Notaulices well defined but not sharply costate. Sternaulus sharply defined, reaching posterior corner of mesopleurum. Dorsal surface of side panels of propodeum showing much intricate rugosity. Areolet of fore-wing almost triangular; distal abscissa of postmarginalis almost as long as proximal abscissa. Segments 3–4 of middle tarsus very short, 4 being not longer than wide; segment 4 of hind tarsus about 1·33 times longer than wide; inner spur of hind tibia reaching middle of basal segment of hind tarsus; this spur is margined with a particularly distinct row of short bristles on its inner side; hind claw with strong lobe and deep cleft between lobe and claw proper; outer side of middle tibia with 7 thick teeth, very irregularly spaced. Gaster of generalised form. Tergite 1 about as long as its apical width, markedly triangular, striate all over. Ovipositor sheath about as long as propodeum plus gaster and, seen from above, as bristly at apex as at middle.

MATERIAL EXAMINED

Holotype ♀, **Hungary**: Hortobargy, Zam, 2–23.v.1975 (*Kaszab*) (HNHM).

HOST. Unknown.

COMMENTS. *A. anchisiades* is remarkable for the shortness of certain tarsal segments; because of this feature it is distinct from all the other species included in this revision, with the exception of *achterbergi*. It is also to some extent characterised by the appearance of the head in facial view and also by the bristly apex of the ovipositor sheaths.

Agathis achterbergi sp. n.

(Fig. 14)

♀, *ca* 4·5 mm long (excluding ovipositor). Black. Hind femur entirely black; hind tibia obscurely yellowish on apical half but with heavily blackened apex; a distinct prebasal, infuscate band present. Wings brownish but less so than in the related anchisiades.

Head in facial view only moderately elongate (Fig. 14). Malar space about 0·66 times as long as longer diameter of eye. Galea short, slightly less than twice as long as wide, dull, coriaceous. Between antennal insertions a rather sharp keel that is sharply angled before it extends upwards, on a lower level, and unites with a deep, narrowly V-shaped cavity in front of anterior ocellus. Antenna long, thin, tapering towards apex, 31-segmented; flagellum distinctly more bristly than in *anchisiades*; segment 4 from apex about 1·66 times longer than wide. Thorax in profile like that of *anchisiades*. Notaulices deeply impressed. Sternaulus reaching posterior corner of mesopleurum. Side of pronotum anterior to oblique trough coarsely rugose-reticulate, especially on upper half. The two longitudinal keels of propodeum obscured by longitudinal rugosities; side panels in greater part smooth, polished. Areolet of fore-wing markedly 4-sided; radial cell rather long; distal abscissa of postmarginalis fully 0·75 times as long as proximal abscissa. Middle tarsus short, segment 4 hardly longer than wide; outer side of middle tibia with 5 rather weak teeth arranged more or less in a row; inner spur of hind tibia reaching middle of basal segment of hind tarsus; hind claw with strong, pointed lobe. Gaster of generalised form. Tergite 1 about as long as apically wide, rugulose but becoming smooth across apical quarter; rest of gaster highly polished. Ovipositor sheath hardly longer than gaster, bristly at apex as in *anchisiades*; ovipositor itself straight, rather thick.

MATERIAL EXAMINED

Holotype ♀, **Holland**: Waarder (Z–H), Oostende, 18.v.1970 (*C. van Achterberg*) (RNH).

HOST. Unknown.

COMMENTS. This species, as noted under *anchisiades*, is characterised by the shortness of the middle tarsus. The two species are in fact remarkably alike but the difference in the shape of the head in a facial view and in the length of the galea is too strong to fall within the range of specific variation. It is probable that *anchisiades* and *achterbergi* are representatives of a species-group which is characterised essentially by the shortness of the middle tarsus and the strong lobe of the hind claw.

Agathis minuta Niezabitowski

(Fig. 29)

Agathis minuta Niezabitowski, 1910: 81. Syntypes, POLAND (lost).

♂ ♀, 2·5–3·0 mm long (excluding ovipositor). Black. Hind femur infuscate more or less throughout, sometimes flushed with paler colouring towards apex; hind tibia pale brownish to pale brownish yellow but paler parts of legs dingy.

♀. Head in facial view hardly lengthened, subtriangular (Fig. 29). Malar space very short, slightly less than half longer diameter of eye, 5 : 11. Mouth-parts very short; galea hardly longer than wide; preapical segment of labial palpus hardly twice as long as wide. A keel present between antennal insertions and almost always a rather well-defined V-shaped impression in front of anterior ocellus. Antenna with 23–25 segments. Thorax of generalised form, much like that of *glabricula* as seen in profile (cf. Fig. 41). Notaulices sharply defined. Sternaulus very short, isolated, not reaching posterior corner of mesopleurum. Propodeum tending to be rugose all over, the two medial, longitudinal keels sometimes obscured by rugosities. Areolet of fore-wing usually sharply triangular; radial cell rather small, distal abscissa of postmarginalis fully 0·66 times as long as proximal abscissa. Hind claw without a lobe; inner spur of hind tibia not reaching middle of basal segment of hind tarsus; outer side of middle tibia with 4–5 teeth arranged in a row (difficult to see because of infuscation of tibia). Gaster rather short and broad. Tergite 1 about as long as wide at apex and vaguely striate to rugose-striate all over. Tergites 2+3 with the usual, transverse, blister-like swelling at base and sometimes with traces of rugosity to sides of, and apical to, this swelling. Ovipositor sheath about as long as body but markedly variable in length.

♂. Like female in all essential details. Antenna thin, the preapical segment about twice as long as wide.

MATERIAL EXAMINED

42 ♂, 84 ♀, **Germany**, **Great Britain**, **Ireland**, **Sweden**.

HOST. *Coleophora glaucicolella* Wood (Coleophoridae) on *Juncus inflexus* L. (England: Worcester, nr Redditch, 3 ♀, 1 ♂ (BMNH)).

COMMENTS. This is the most commonly represented species in all the collections examined and is widely distributed. Easy to recognise on three main features: the shape of the head in facial view, the shortness of the galea and the long distal abscissa of the postmarginalis.

Agathis asteris Fischer

(Figs 31, 37)

Agathis asteris Fischer, 1966: 185. Holotype ♀, AUSTRIA (NM) [examined].

♂ ♀, 2·8–3·5 mm long (excluding ovipositor). Black. Hind femur blackish or at least considerably infuscate; general leg-colour much as in *minuta*.

♀. Head in facial view not much lengthened (Fig. 31). Malar space a little longer than half longer diameter of eye, 7 : 12. Mouth-parts much lengthened in comparison with *minuta*; galea about 1·5 times longer than malar space. Almost no keel between antennal insertions and virtually no impression in front of anterior ocellus. Head in dorsal view rather deeply hollowed out behind to receive the somewhat strongly narrowed, anterior part of thorax. Antenna with 21–23 segments (2 ex.); flagellum distinctly thickened beyond middle; segments at this thickened part varying from being almost square in outline to 1·25 times longer than wide. Thorax markedly elongate (Fig. 37); in profile almost twice as long as wide; in dorsal view considerably narrowed in front, much more so than in *minuta*. Sternaulus long, groove-like, sometimes almost absent. Propodeum with some sort of rugosity almost everywhere. Areolet of fore-wing distinctly 4-sided, narrowed above; distal abscissa of postmarginalis virtually absent. Hind claw without lobe; outer side of middle tibia with 3–5 teeth, difficult to see in two out of three females because tibia in greater part infuscate; hind spurs rather weak; inner one not reaching middle of basal segment of hind tarsus. Tergite 1 slightly longer than wide, striate-rugose all over. Basal half of tergites 2+3 without rugosity in the three females available. Ovipositor sheath about twice as long as gaster, distinctly a little widened at extreme apex; hairs on outer side of expanded part distinctly shorter and less obvious than those proximal to it.

♂. Like female. Antenna with 23 segments, thread-like; preapical segment twice as long as wide. Sternaulus virtually absent in the single example.

MATERIAL EXAMINED

Austria: 1 ♀ (holotype), Burgenland, Zitzmanns-dorfer Wiesen (*Kasy*) (NM); 3 ♀, 1 ♂, Illmitz, Einsetzlacke, 7.ix.1971, ex *Coleophora halophyella* Zimmerman (*Jäckh*) (EH).

HOST. *Coleophora halophyella* Zimmerman (Coleophoridae).

COMMENTS. This species is largely characterised by the long mouth-parts (cf. *minuta*, also a parasite of Coleophoridae), undecorated frons, elongate thorax and very short distal abscissa of the postmarginalis. Of the three last-mentioned characters it is mainly the elongate thorax that separates *asteris* from the *glabricula*-complex with its much more generalised thoracic form.

Agathis glabricula Thomson

(Figs 28, 41, 46)

Agathis glabricula Thomson, 1895: 2228. LECTOTYPE ♀, SWEDEN (ZI), here designated [examined].
Agathis albicostellae Fischer, 1966: 399. Holotype ♀, AUSTRIA (NM) [examined]. **Syn. n.**

♂ ♀, 3·0–3·2 mm long (excluding ovipositor).

♀. Black. Hind femur black; hind tibia blackish on apical third with rather conspicuous, blackish, basal ring.

Head in facial view rather sharply narrowed below eyes (Fig. 28), strongly transverse in dorsal view. Virtually no trace of a keel between antennal insertions, and at most a shallow dimple in front of anterior ocellus. Malar space about 0·66 times as long as longer diameter of eye, 7 : 12. Galea 2·0–2·5 times longer than wide, about as long as malar space or sometimes a little shorter. Antenna with 25–28 segments; flagellum decidedly thin with the three preapical segments considerably longer than wide. Thorax in profile of generalised form (Fig. 41). Notaulices deeply impressed. Sternaulus deeply impressed, reaching posterior corner of mesopleurum. Sculpture of propodeum variable; sometimes the normally polished side panels (as in lectotype) covered with an intricately rugose sculpture. Areolet of fore-wing variable; mostly

4-sided, more rarely triangular; radial cell short; distal abscissa of postmarginalis hardly 0·33 times as long as proximal abscissa; proximal abscissa sometimes distinctly thickened. Outer side of middle tibia with 2–3 teeth; inner spur of hind tibia not quite reaching middle of basal segment of hind tarsus; hind tarsal claw mostly without trace of free lobe but sometimes distal end of weak, basal thickening produced to form a slight angulation or tooth (as in lectotype, Fig. 46). Tergite 1 about as long as apically wide, sculptured all over, the sculpture varying between even striation and rugose-striation. Basal half of tergites 2+3 with transverse, blister-like swelling and apical to this with a variable amount of broken, rugose-striation. Ovipositor sheath 1·33–1·50 times longer than gaster.

♂. Like female except for sexual differences.

MATERIAL EXAMINED

Austria: 1 ♀ (holotype), Braunsborg bei Hainburg, ex *Coleophora albicostella* Duponchel (NM). **Bulgaria:** 2 ♀, Rhodopi, Costinbrod, vi. (*Zaykov*) (ZC); 2 ♀, Valtshe, vii. (*Zaykov*) (ZC); 1 ♀, Plovdiv, ix. (*Zaykov*) (ZC). **Great Britain:** 3 ♀, 7 ♂, Dorset, Portland Bill, bred viii.1959 ex *Coleophora troglodytella* Duponchel, collected v.1959 (*Ford*) (BMNH). **Ireland:** 3 ♀, 1 ♂, Co. Clare, The Burren, ex *Coleophora troglodytella* Duponchel (*Bradley*) (BMNH). **Sweden:** 1 ♂ (lectotype), Skåne, Ilstorp (*Thomson*) (ZI).

HOST. *Coleophora troglodytella* (Duponchel) (Coleophoridae).

COMMENTS. Fischer (1957*a*: 11) examined the syntypes of *glabricula* and labelled one of them 'Agathis glabricula Th.Type' but did not publish the designation; this specimen is here designated lectotype and is labelled accordingly.

This species and the two that follow present a difficult taxonomic problem and only a provisional solution is suggested. In certain respects, such as length of ovipositor and perhaps also of galea, the three species appear to overlap. They may be forms of a single species whose variation in structure could be due to the effect of extrinsic factors. However, since names exist for the three segregates, they are kept separate until more material or biological information becomes available.

Agathis meridionellae Fischer

(Fig. 27)

Agathis meridionellae Fischer, 1957*b*: 1. Holotype ♀, AUSTRIA: Karawanken (ZSBS) [not examined].

♀. This segregate differs from *glabricula* only in the following details.

Galea a little shorter. Head in facial view triangular, less narrowed below eyes (Fig. 27). In two females (paratypes), ovipositor sheath clearly longer than gaster; in five females from England, Worcester City, it is hardly longer, and in one the propodeum is rugose all over, as in some of the females of *glabricula* recorded from England, Portland Bill. The specimens from Sweden have the ovipositor sheath hardly longer than the gaster.

MATERIAL EXAMINED

Austria: 2 ♀, 1 ♂ (paratypes), Karawanken, Loibtal, ex *Coleophora meridionella* Klimesch (EH). **Great Britain:** 5 ♀, Worcester, ex *Chrysoesthia hermannella* F. (BMNH). **Sweden:** 17 ♀, 7 ♂, Lund, ex *Chrysoesthia* (*Microsetia* on label) *sexguttella* (Thunberg) (ZI, 2 ♂, 6 ♀, in BMNH).

HOSTS. *Coleophora meridionella* Klimesch (Coleophoridae). *Chrysoesthia sexguttella* (Thunberg); *Chrysoesthia hermannella* (F.) (Gelechiidae).

Agathis artemesiana Fischer

(Fig. 24)

Agathis artemesiana Fischer, 1966: 397. Holotype ♀, AUSTRIA (NM) [examined].

This species, which may belong to the *glabricula*-aggregate, differs from *glabricula* and *meridionellae* as follows.

♀, *ca* 3·5 mm long (excluding ovipositor); slightly larger than the other two species. Wings slightly more darkened. Head in facial view slightly more elongate than in *meridionellae*, more like that of *glabricula* (cf. fig. 28); in dorsal view (Fig. 24). Flagellum distinctly thickened distal to middle, the thickest segments being no more than 1·25 times longer than wide; antenna 24–26-segmented. Areolet triangular or almost so. Ovipositor sheath apparently always short, about as long as gaster.

MATERIAL EXAMINED

Austria: 1 ♀ (holotype), Schlossofer Platte, Marchfeld (*Kazy*) (NM). **Bulgaria**: 2 ♀, Rhodopi, Nikolovo, viii.1976, on *Medicago sativa* L. (*Zaykov*) (ZC); 1 ♀, Velingrad, viii.1977 (*Zaykov*) (ZC); 1 ♀, Plovdiv, ix.1976)*Zaykov*) (ZC). **Great Britain**: 1 ♀, Cambridgeshire, Fleam Dyke, 20.vii.1958 (*Ford*) (BMNH); Cornwall, St Osyth, 3.viii.1914 (*Harwood*) (BMNH). **Ireland**: 3 ♀, Co. Louth, Baltray, 23.vii.1941 (*Stelfox*) (BMNH); 1 ♀, Co. Kildare, Royal Canal, 30.vi.1950 (*Stelfox*) (BMNH). **Sweden**: 1 ♀, Skåne, Degaberga, 14.vii.1938 (*Perkins*) (BMNH).

HOST. *Coleophora granulatella* Zeller (Coleophoridae).

COMMENTS. What characterises this species, if indeed it is distinct, is the shape of the middle segments of the flagellum.

Agathis pedias sp. n.

(Figs 15, 39)

♀, 4·5–4·8 mm (excluding ovipositor). Black. Hind tibia pale yellowish, almost whitish, with dark basal ring and apical infuscation occupying about apical two-fifths. Wings pale compared with other species, almost hyaline.

Head in facial view weakly elongate (Fig. 15). Virtually no keel between antennal insertions and only a very feeble impression in front of anterior ocellus. Malar space about 0·66 times as long as longer diameter of eye. Mouth-parts rather short; galea as long as malar space, markedly coriaceous. Antenna with 24–25 segments. Thorax decidedly lengthened, twice as long as wide in profile; hardly different from that of *fulmeki* (cf. Fig. 42). Sternaulus fairly sharply defined but remote from both anterior and posterior margin of mesopleurum. Panels of propodeum not extensively polished, sometimes almost obscured by encroaching lateral rugosities. Outer side of middle tibia with 8–10 teeth arranged in a row, some of them paired; inner spur of hind tibia hardly more than 0·33 times as long as basal segment of hind tarsus; legs long, slender; 3rd segment of hind tarsus very slightly longer than apical segment; hind claw with weak, angular projection at base. Areolet of forewing almost 4-sided; distal abscissa of postmarginalis about 0·75 times as long as proximal abscissa. Gaster somewhat long, narrow (Fig. 39); tergite 1 about 1·33 times longer than apically wide, rugose-striate all over. Ovipositor sheath as long as body.

MATERIAL EXAMINED

Holotype ♀, **Spain**: Cadiz, Villamartin, 11.vi.1960 (RNH).

Paratypes. **Spain**: 2 ♀, same data as holotype (RNH, BMNH); 1 ♀, Alicante, Puerto de Confrides, (*H. Teunissen*) (RNH). **Portugal**: 1 ♀, Caldes da Rainha, 14.v.1958 (RNH); 2 ♀, Trajouce, San Domingos de Rana, 15.v.1958 (RNH). **Greece**: 1 ♀, Athens, Imittós, 26.iv.1980 (BMNH).

HOST. Unknown.

COMMENTS. The relatively large number of teeth on the outer side of the middle tibia suggests that *pedias* has an affinity with *fulmeki*, but the latter has shorter legs, a much more clearly defined impression in front of the anterior ocellus and a longer galea. A decidedly slender habitus is somewhat characteristic of *pedias*.

Agathis rostrata Tobias

Agathis rostrata Tobias, 1963: 881. Holotype ♀, U.S.S.R. (AS) [not examined].

My interpretation of this species is based on an examination of a single female determined by Tobias. This specimen bears the label 'W. Russland, Jurburg (Winogradoff – Nikitin)' and is probably that which Tobias records from Lithuania, Jurbakas, in his original description. Although the data agree, Tobias does not indicate that it is a paratype, merely labelling it as '*Agathis rostrata* sp. n., Tobias det.'.

♀, 3·5–4·0 mm long (excluding ovipositor). Similar to *anglica* with which it may be compared as follows. On the whole darker in colour (this may have little significance). Paler parts of hind tibia dingy yellow; dark ring at base of hind tibia sometimes united with infuscate, apical part by a dark band along upper surface. Head in facial view more gradually narrowed towards mouth. Mouth-parts longer; galea 1·25–1·33 times longer than malar space and rather abruptly narrowed in apical half. No trace of keel between antennal insertions and at most the merest trace of a dimple in front of anterior ocellus. Antenna with 24–26 segments: 24 (1), 25(2), 26 (1). Thorax slightly shallower than in *anglica*, seen in profile. Side of pronotum anterior to oblique trough more distinctly rugose-striate. Sternaulus different in that it reaches anterior margin of mesopleurum as foveate rugosity or row of foveae. Sculpture of propodeum variable as in *anglica*; sometimes rugose almost all over. Radial cell short as in *anglica* and areolet equally 4-sided; distal abscissa of postmarginalis slightly longer. Gaster as in *anglica* but ovipositor sheath hardly as long as gaster plus propodeum.

MATERIAL EXAMINED

Germany: 1 ♀, Ruthe coll. (BMNH). **Great Britain**: 1 ♀, Kent, Eynsford, 24.vii.1932 (*Nixon*) (BMNH). **Italy**: 1 ♀, Südtirol, Algund, 1800 m, 30.viii.1967 (*Haeselbarth*) (EH); 1 ♀, St Peter/Ahrntal, 1350 m (*Haeselbarth*) (EH). **Sweden**: 1 ♀, Skåne, Degaberga, 12.vii.1938 (*Perkins*) (BMNH); 1 ♀, Silvakra, viii.1976 (*Huddleston & Quinlan*) (BMNH). **U.S.S.R.**: 1 ♀, Lithuania, Jurbakas (*Winogradoff-Nikitin*) (AS).

HOST. Unknown.

COMMENTS. This species is essentially characterised by its long sternaulus, which reaches the anterior margin of the mesopleurum, and the long, rather subtly distinctive galea.

Agathis pappei sp. n.

(Fig. 12)

♀, 3·0–3·5 mm (excluding ovipositor). Black. Legs obscurely yellowish where they are pale; hind femur infuscate but yellowish at apex; in two out of three examples, including type, pale colour at apex of hind femur extends as a pale band along dorsal surface as far as base. Wings almost hyaline.

Head in facial view only weakly lengthened (Fig. 12). Face very shiny, with variable amount of somewhat indistinct punctation, more clearly evident in holotype. Anterior margin of clypeus somewhat protuberant. Mouth opening wide and mandibles of powerful build. Malar space 0·66 times as long as longer diameter of eye. Galea about twice as long as wide and as long as malar space. No trace of an impression or dimple in front of anterior ocellus. Antenna short, thin, with 22–24 segments. Mesoscutum a little flattened, its middle lobe, and to a less extent, lateral lobes, with some vague, rather sparse punctation. Notaulices deeply impressed, foveate, their outer margin bordered with a row of indistinct punctures. Scutellum slightly depressed behind and rugulose here. Areolet of forewing weakly 4-sided; stigma rather broad; apical abscissa of postmarginalis almost absent. Hind femur slightly more than twice as long as wide, the legs being rather short and thick; inner spur of hind tibia hardly reaching middle of basal segment of hind tarsus; claws rather long, without basal lobe or tooth. Sternaulus in the form of a fine groove, not reaching anterior margin of mesopleurum. Gaster somewhat short. Tergite 1 about 1·25 times longer than apical width, indistinctly striated more or less all over; rest of gaster smooth, shining. Ovipositor sheath as long as gaster plus propodeum.

MATERIAL EXAMINED

Holotype ♀, **Hungary**: Or, Sz.Miklós, 1.xi.1917 (HNHM).

Paratypes. **Hungary**: 2 ♀, Tompa, 11.ix.1962 (*Solymosné*) (HNHM, BMNH).

HOSTS. Unknown.

COMMENTS. This aberrant species cannot be confused with any other from the region; it is characterised mainly by the shape of the head as seen from in front, the wide mouth-opening and the correspondingly large, powerful mandibles.

Agathis gracilipes Hellén

Agathis gracilipes Hellén, 1956: 122. Lectotype ♀, FINLAND (ZH), designated by Tobias [examined].

I have not been able to discover where or even whether the lectotype designation was published.

♂ ♀, 4·0–4·5 mm (excluding ovipositor). Black. Hind femur infuscate but paler in apical half; hind tibia obscurely yellowish, darkened over apical two-fifths, with a broad but faint infuscate band at base.

♀. Head in facial view not very elongate. Malar space slightly shorter than longer diameter of eye, 10:13. Galea very short, hardly longer than wide. No trace of keel between antennal insertions; a very weak, V-shaped impression in front of anterior ocellus. Head in dorsal view strongly transverse, evenly rounded behind eyes. Antenna long, thin, with at least 26 segments. Thorax of generalised form, 1·5 times longer than wide in profile. Notaulices deeply impressed. Sternaulus well defined, rugose, reaching posterior margin of mesopleurum and also, through a line of rugose-punctation, anterior margin. Propodeum with two weak, longitudinal keels; lateral panels polished medially. Radial cell rather long; areolet sharply triangular; distal abscissa of postmarginalis fully 0·5 times as long as proximal abscissa. Legs long, thinner than in any other included species; 3rd segment of middle tarsus fully 2·5 times longer than wide; hind femur 4·5 times longer than wide; hind claw without lobe but with slight, basal thickening; outer side of middle tibia with one, indistinct tooth. Tergite 1 about 1·33 times longer than apically wide. Basal half of tergites 2+3 with some vague, rugose-striation towards sides. Ovipositor sheath about as long as body.

♂. Antenna with 26 segments, long, thin, with apical segment fully 1·5 times longer than wide. Areolet of fore-wing with short stalk. Otherwise like female.

MATERIAL EXAMINED

Finland: 1 ♀ (lectotype), Tvärminne, Henriksberg (ZH); 1 ♂, 1 ♀, Kexholm, 17.vii.1923 (*Krogerus*) (♂ in ZH, ♀ in BMNH).

HOSTS. Unknown.

COMMENTS. This species occupies a marginal position within *Agathis*. Because of its long, slender legs and very short mouth-parts it could not be confused with any other species under review.

Agathis melpomene sp. n.

♂ ♀, 4·8–5·0 mm long (excluding ovipositor). Black. Hind femur yellowish, contrastingly darkened on apical one-third to two-fifths.

♀. Head in facial view elongate and considerably narrowed below eyes; in lateral view, line of face and that of clypeus appear virtually in one plane. No keel between antennal insertions and virtually no impression in front of anterior ocellus. Galea 1·35–1·50 times longer than malar space, faintly coriaceous and rather abruptly narrowed from middle to apex. Antenna with 28 segments; flagellum virtually filiform. Thorax of generalised form. Notaulices deeply impressed throughout. Sternaulus strongly developed, reaching posterior corner of mesopleurum, and in one paratype (Markovo) extending also as far as anterior margin of mesopleurum. Propodeum with usual, two longitudinal keels; lateral panels towards anterior dorsal surface covered with coarse shiny rugosity. Radial cell rather long; distal abscissa of postmarginalis fully 0·75 times longer than proximal abscissa; areolet 4-sided but distinctly narrowed towards edge of wing. Outer side of middle tibia (holotype) with a row of 8 rather broad-based teeth, some of them overlapping; 6–7 teeth in the two paratypes; these slightly smaller and less close together than in holotype; inner spur of hind tibia about two-fifths as long as basal segment of hind tarsus; hind claw with conspicuous, dentiform lobe and wide cleft between this and claw proper. Tergite 1 hardly longer than apically wide; almost smooth in the two paratypes but with vague rugosity over middle part in holotype. Tergites 2+3 polished, smooth (cf. *anglica*). Ovipositor sheath hardly as long as gaster plus thorax.

♂. Antenna with 25–27 segments; flagellum very thin. In profile clypeus rises slightly above line of face. Outer side of middle tibia with 7 teeth.

MATERIAL EXAMINED

Holotype ♀, **Hungary**: Taratóvarós, 28.v.1959 (*Bajári*) (HNHM).

Paratypes. **Bulgaria**: 1 ♀, Rhodopi; 1 ♀, Markovo, 23.vi.1978 (*A. Zaykov*) (HNHM); 1 ♀, S. poljana, 24.vi.1975 (*A. Zaykov*) (BMNH).

Nonparatypic material. **Hungary**: 3 ♂, same data as holotype (HNHM; 1 in BMNH).

HOST. Unknown.

COMMENTS. This species is at once separable from *anglica* by the size of the radial cell, the strongly developed, dentiform lobe of the hind claws and the reduction of sculpture on tergite 1. The presence of more numerous teeth on the outer side of the middle tibia is also of value though this character is likely to vary. The general conformation of the radial cell is like that of *varipes*, but *melpomene* is distinguished by the shape of the head in facial view. The males are variable, consequently they are excluded from the type-series.

Agathis montana Shestakov

(Figs 9, 21)

Agathis montana Shestakov, 1932: 261. Holotype ♀, U.S.S.R. (AS) [not examined].

The present interpretation of this species is based on specimens compared with the holotype by Tobias.

♂ ♀, 3·5 mm (excluding ovipositor). Black. Hind femur infuscate throughout in one female, tipped with reddish in another (Kokcengir Hills) and entirely red in a third (Hungary: Vacz Csorög). Wings variably infuscate.

♀. Head in facial view moderately elongate (Fig. 9); in lateral view of head, clypeus and face lie in the same plane (Fig. 21). Malar space a little shorter than longer diameter of eye, 10 : 13. Galea slightly longer than malar space, 13 : 10. No trace of a keel between antennal insertions. Virtually no trace of an impression or dimple in front of anterior ocellus. Antenna with 22–23 segments. Thorax in profile markedly elongate, nearly twice as long as wide, 25 : 14. Notaulices sharply defined but not deep so that lobes lack a markedly convex appearance. Sternaulus in form of fine groove, only weakly rugose, not reaching anterior margin of mesopleurum. Propodeum sculptured all over in one female (Kokcengir Hills) but with polished area within lateral panels in the others. Areolet of fore-wing clearly 4-sided, though sometimes triangular according to Tobias; distal abscissa of postmarginalis hardly 0·33 times as long as proximal abscissa. Claws rather long, without basal tooth or basal thickening; outer side of middle tibia with a row of 4–6 rather thick teeth; hind femur somewhat thick, 2·5 times as long as wide; inner spur of hind tibia a little less than 0·5 times as long as basal segment of hind tarsus. Tergite 1 about as long as apically wide, finely rugose-striate all over. Ovipositor sheath about as long as gaster plus propodeum.

♂. Like female except for sexual differences. Antenna short, very thin; segment 4 from apex fully twice as long as wide.

MATERIAL EXAMINED

Hungary: 1 ♀, Vacz Csorög (*Biró*) (HNHM); 1 ♀, Gyula, Veszelycsarda, 19.xi.1963 (*Moczar*) (HNHM); 1 ♀, Apajpuszta (*Moczar*) (HNHM). **U.S.S.R.**: 1 ♀, 1 ♂, Kazachstan, Zhana-Arka, Karagand, viii–ix.1959 (*Tobias*) (AS); 1 ♀, Moldavia, Kishenev, 8.x.1966 (*Goncharenko*) (AS).

HOST. Unknown.

COMMENTS. This somewhat squat-looking species is largely characterised by the shortness of the antenna and the elongate thorax. In respect of leg coloration and the shape of the areolet of the fore-wing *montana* is, as Tobias points out, extremely variable. There is also a subtle distinctiveness in the shape of the head as seen in profile, but it is based on features that are not easily described.

RHAMPHAGATHIS Tobias

Rhamphagathis Tobias, 1962: 1195. Type-species: *Agathis nasicornis* Telenga, by monotypy.

DIAGNOSIS. Face very broad across clypeus; latter in profile projecting as a snout. Labrum small, transverse. Mandible seen from in front, broadened, flattened, with two blunt, short teeth at apex; thus seen, mandible almost lamelliform. Mesoscutum in dorsal view flattened, with strongly produced anterior corners. Propleura much flattened in dorso-ventral direction, their posterior margin reflexed to accommodate base of anterior coxae. Wing-venation like that of *Agathis*. Legs rather short; hind femur very stout.

Rhamphagathis nasicornis (Telenga)

Agathis nasicornis Telenga, 1955: 253. Lectotype ♀, U.S.S.R.: Kharkov (AS), designated by Tobias, 1962: 1195 [not examined].

♂ ♀, 3·5–4·0 mm long (excluding ovipositor).

♀. Black. Hind femur deeply infuscate; hind tibia obscurely yellowish on basal half with faint dark band near base.

Head in facial view as long as broad; seen from above with occiput deeply emarginate, the margin falling away steeply, almost angularly where it reaches posterior ocelli. Galea very slightly longer than malar space. In front of anterior ocellus hardly a trace of a dimple but with short keel extending downwards between antennal insertions. Antenna thin, thread-like, with 27–28 segments. Thorax in profile markedly elongate. Propleura curiously flattened, dull, rugulose all over, densely pubescent and contrasting with smooth, highly polished side of pronotum. Middle lobe of mesoscutum projecting far forwards on each side to form a conspicuous shoulder; these shoulders coarsely rugose where they join notaulices; in profile, flattened mesoscutum falls perpendicularly to pronotum. Notaulices distinct throughout, slightly widened in front and here rugose-foveate. Sternaulus in form of thin groove reaching posterior corner of mesopleurum but not anterior margin of this. Legs rather short, thick; hind femur twice as long as wide; outer side of middle tibia with 6–10 thick, spine-like teeth on apical half; front coxa rather small, flattened on lower side and here with sculpture similar to that of propleura and in sharp contrast with smooth, shiny surface of middle and posterior coxae; claws with a lobe. Radial cell rather narrow; areolet in female almost triangular; distal abscissa of postmarginalis very short, reduced almost to a point. Gaster somewhat short; tergite 1 about 1·25 times longer than apically wide, much widened towards apex; surface finely, rather weakly striated. Ovipositor sheath very slightly longer than gaster.

♂. Antenna with 26 segments (2 ex.); flagellum very slender; two preapical segments fully twice as long as wide. Otherwise like female except for sexual differences.

MATERIAL EXAMINED

Germany: 2 ♂, 2 ♀, Ruthe coll. (BMNH). **U.S.S.R.**: 1 ♀, Melito (*Kokujev*) (AS).

HOST. Unknown.

COMMENTS. This is a highly peculiar, quite isolated species. Apart from its generic features, it resembles the genus *Agathis* in general habitus. The curious appearance of the propleura suggests an adaptation to a specialised mode of existence. Among the species from the region *Rhamphagathis nasicornis* is easily recognised by its protuberant clypeus and prominent mesoscutal shoulders.

MICRODUS Nees von Esenbeck

Microdus Nees von Esenbeck, 1814: 184. Type-species: *Ichneumon calculator* Fabricius, by subsequent designation (Haliday *in* Westwood, 1840: 63, synopsis).

DIAGNOSIS. ♂ ♀. Head in facial view transversely elliptical. Frons in front of anterior ocellus without deepened and margined pit or furrow (cf. *Agathis*). Mouth-parts unmodified, never lengthened to form a beak-like structure; galea not longer than wide; maxillary palpus often appearing 3-segmented because preapical segment (3rd) sometimes so short as to be hardly noticeable; this segment always conspicuously shorter than apical segment. Sternaulus always present. Venation much as in *Agathis* (cf. Fig. 50); 1st discoidal cell and 1st cubital cell not separated by a vein; 2nd cubital cell always in form of small triangular or subtriangular areolet; distal abscissa of postmarginalis fully as long as proximal abscissa. Outer side of middle tibia with 2–8 teeth, usually 3–4. Ovipositor at least 0·66 times as long as gaster.

Holarctic in distribution.

Muesebeck (1927) considered that *Microdus* could not be retained as a genus separate from *Agathis* and accordingly synonymised them. His opinion was based on a study of North American material and found its support in the breakdown of the single character – the shape of the head – traditionally used to separate the two genera.

Telenga (1955: 273) reinstated *Microdus* without giving reasons for rejecting Muesebeck's opinion. He has been followed by Tobias (1976*b*: 97) who recognised *Microdus* on biological rather than morphological grounds. Tobias argues that *Agathis* species, because of their lengthened mouth-parts, tend to inhabit arid, steppe-like regions where flowers conceal their nectar in deep corollas, a floral adaptation, Tobias adds, that makes the nectar available to long tongued insects inhabiting regions where they are exposed to moisture deficiency. *Microdus*, on the other hand, is considered to be largely dependent on Lepidoptera feeding on forest trees and in consequence is well represented in the richly forested regions of the Far East.

Tobias' observations are probably pertinent to the biology of the Agathidinae but it is arguable whether they provide a foundation for validating genera in a group with so unstable a classification as the Braconidae.

Nevertheless, the two genera can be separated on sound morphological characters as follows.

1 Mouth-parts lengthened in the form of a beak, galea rarely as short as 1·33 times longer than wide, nearly always much longer; head in facial view lengthened (Figs 1–6); ocelli in a high triangle, the posterior tangent to the anterior ocellus passing freely in front of posterior pair; foramen of metasternum accommodating hind coxa not closed on inner side by a sclerotized bridge. ***AGATHIS*** Latreille

– Mouth-parts not lengthened in the form of a beak, the galea not longer than wide; head in facial view transversely elliptical; ocelli in a low triangle, the posterior tangent to the anterior ocellus usually cutting, or at least touching, posterior pair; foramen of metasternum accommodating hind coxa closed on inner side by a sclerotized bridge. ***MICRODUS*** Nees von Esenbeck

Key to species (females)

1 Claws unarmed, without basal lobe; whole of hind leg blackish, except for yellowish band at extreme base of tibia.
Thorax marked with black and red .... ***calculator*** F. (p. 217)

– Claws armed with conspicuous basal lobe; at least hind tibia predominantly pale 2

2 Inner margins of antennal sockets uniting to form a smooth knob that may be prolonged behind to form a short, blunt keel; tergites 2+3 with at least basal half with a well-defined sculpture that extends as far as the middle transverse suture or beyond 3

– Inner margins of antennal sockets widely separated (except in *pumilus* but this species has ovipositor sheath much shorter than gaster), the surface between them either flat, smooth, with weak medial groove or (rarely) rugose; tergites 2+3 at most with some vague sculpture on basal half 7

3 Sculpture of tergites 2+3 tending to cease abruptly at second suture; at most faint traces of scaly-reticulation on apical half of tergite 4

– Sculpture of tergites 2+3 extending almost to apex 6

4 Basal half of tergites 2+3 with sharp, shiny, longitudinal striation; ovipositor sheath much longer than gaster .... ***dimidiator*** Nees von Esenbeck (p. 219)

– Basal half of tergites 2+3 with somewhat confused rugosity, the longitudinal elements varying much in intensity; ovipositor sheath at most slightly longer than gaster 5

5 Notaulices almost fading out on disc; sculpture of basal half of tergites 2+3 consisting of vague scaly-reticulate rugosity with only weak longitudinal elements ***lugubrator*** Ratzeburg (p. 219)

– Notaulices sharply defined throughout; sculpture of basal half of tergites 2+3 with a predominant sculpture of striation .... ***fortipes*** Reinhard (p. 220)

6 Tergites 2+3 evenly, longitudinally striate; hind tibia, except for darkened apex, reddish yellow .... ***rufipes*** Nees von Esenbeck (p. 218)

– Tergites 2+3 not evenly striate, being in part rugulose to scaly-reticulate; hind tibia whitish with darkened apex and darkened, basal ring .... ***rugulosus*** Nees von Esenbeck (p. 217)

7 Radius distinctly bent inwards at middle towards stigma; gaster often conspicuously pale-marked 8

– Radius straight or almost so; gaster virtually always black 11

8 Small species not exceeding 3·2 mm; gaster entirely black or blackish; hind femur blackish or at least deeply infuscate 9

– Larger species not less than 4·5 mm; gaster with at least basal half of tergites 2+3 reddish or yellowish (rarely gaster entirely dark); hind femur red 10

9 Radius very strongly bent inwards towards stigma, markedly colourless in middle third; notaulices deeply impressed throughout; hind tibia whitish, infuscate on rather less than apical half and usually with dark basal ring .... ***cingulipes*** Wesmael (p. 221)

– Radius less bent inwards towards stigma, darker at middle; notaulices almost absent on disc; hind tibia dull reddish with less apical infuscation and with hardly a trace of a basal band ***nugax*** Reinhard (p. 222)

10 Head in facial view slightly elongate (Fig. 32); internal rim of antennal sockets with distinct dentiform projection; hypopygium emarginate at apex, appearing strongly truncate in profile .... ***linguarius*** Nees von Esenbeck (p. 223)

– Head in facial view strongly transverse (Fig. 30); internal rim of antennal sockets without such a projection; hypopygium not emarginate at apex, appearing pointed in profile.
Usually entire gaster, except tergite 1, reddish yellow .... ***conspicuus*** Wesmael (p. 225)

11 Head in facial view somewhat elongate 12

– Head in facial view not elongate 13

12 Internal rim of antennal socket raised to form a distinct, dentiform projection; in profile, head behind lowest point of eye only weakly concave .... ***linguarius*** Nees von Esenbeck (p. 223)

– Internal rim of antennal socket without such a dentiform projection; in profile, head behind lowest point of eye rather deeply concave.
Gaster beyond tergite 1 entirely reddish yellow, wings, strongly infumate ***zaykovi*** sp. n. (p. 226)

13 Ovipositor sheath hardly 0·66 times as long as gaster .... ***pumilus*** Ratzeburg (p. 221)

– Ovipositor sheath much longer than gaster 14

14 Tergite 1 with a sculpture of fine scaly-reticulation with at most traces of striation towards sides ***eriphyle*** sp. n. (p. 222)

– Tergite 1 without scaly-reticulation, the surface either almost smooth or with longitudinal striation varying in intensity 15

15 Hind femur stout, 3 times as long as wide; gaster shorter and broader; antenna with 29–31

segments; always an elongate, pale mark against posterior margin of eye **tumidulus** Nees von Esenbeck (p. 224)

– Hind femur not so stout, at least 3·5 times longer than wide; antenna with not less than 33 segments; gaster longer, narrower .... **clausthalianus** Ratzeburg (p. 224)

Microdus calculator (Fabricius)

Ichneumon calculator Fabricius, 1798: 225. Holotype ♀, ITALY (ZM) [not examined].
Microdus calculator (Fabricius) Nees von Esenbeck, 1834: 144.
Microdus abscissus Ratzeburg, 1844*b*: 58. Holotype ♂, GERMANY (lost). [Synonymised by Ratzeburg, 1852: 45.]
Agathis calculator (Fabricius) Shenefelt, 1970: 323.
Microdus calculator (Fabricius) Tobias, 1971: 260.

There never has been any doubt about the identity of this species.

♂ ♀, 6·0–7·5 mm long (excluding ovipositor). At least head, propodeum and gaster black; sometimes mesosternum also black; rest of thorax red. Whole of hind leg blackish except for a pale, yellowish band at extreme base of tibia. Wings more or less hyaline.

♀. Head in facial view like that of *linguarius* (cf. Fig. 32), less transverse than in other species; seen from above, very short, strongly transverse. A single blunt, almost knob-like keel between antennal sockets. Ocelli in a low triangle, the posterior tangent to anterior ocellus just touching posterior pair. Preapical segment (3rd) of labial palpus well developed, fully 2·5 times longer than wide. Antenna with 34–35 segments. Notaulices deeply impressed throughout. Sternaulus broad, costate. Prepectal margin clearly defined. Propodeum very coarsely reticulate but without discrete, longitudinal keel or keels. Areolet of fore-wing triangular, usually with short stalk; distal abscissa of postmarginalis about as long as proximal abscissa; anal cell of hind-wing without anellus. Outer side of middle tibia with 3–4 isolated teeth; claw of hind tarsus without trace of either lobe or tooth. Tergite 1 1·33–1·50 times longer than its apical width, strongly, evenly striate all over. Basal half of tergites 2+3 with sculpture like that of tergite 1 but sculpture less regular and not reaching apical corners of this half of tergites 2+3; sculpture tends to be confined to transverse, blister-like basal area. Ovipositor sheath about as long as thorax plus gaster.

♂. Like female but frequently darker; mesopleurum sometimes completely blackened.

MATERIAL EXAMINED

Great Britain: 1 ♀, Hampshire, New Forest, Bishop's Dyke, emerged 21.v.1963 from lepidopterous larva pupating under dead bark of beech (*Fagus*) (BMNH); 4 ♂, Winchester, flying around dead beech tree, viii.1979 (*Else*) (BMNH); 2 ♂, 3 ♀, Surrey, Mickleham, ex *Scardia boleti*, v.1933 (*Ford*) (BMNH); 2 ♂, 3 ♀, Box Hill, vii.1938, ex *Scardia boleti* (*Ford*) (BMNH).

HOSTS. *Morophaga boleti* (Fabricius) (Tineidae) and probably also *Triaxomera parasitella* (Hübner) (Tineidae). According to records quoted by Shenefelt (1970), various people have bred *calculator* from these two lepidopterous hosts.

COMMENTS. This is an unmistakeable species, at least in the region under consideration, and is readily characterised by its red and black colour, large size and, most significantly, by the unique simple claws.

Microdus rugulosus Nees von Esenbeck **comb. rev.**

Microdus rugulosus Nees von Esenbeck, 1834: 148; Reinhard, 1867: 357. Holotype ♀, GERMANY (lost).
Braunsia rugulosa (Nees von Esenbeck) Telenga, 1955: 278; Shenefelt, 1970: 376.

Reinhard was the first reviser of this species and from his excellent treatment of it, the identity of *rugulosus* is not in doubt.

♀, 4–5 mm long (excluding ovipositor). Head and thorax black. Gaster usually entirely blackened above but frequently pale-marked towards apical corners of tergites 2+3; in such cases, the segments posterior to the pale area tend to be entirely pale yellowish brown or reddish brown; in one example (Surrey, Mickleham), basal half of tergites 2+3 is bright reddish yellow. Hind femur varying from entirely infuscate to entirely reddish yellow; when hind femur is pale, the hind tibia is contrastingly whitish with apical third and a basal band infuscate; in examples with darkened hind femur, the tibia is correspondingly darkened; hind coxa reddish yellow over most of basal half or entirely infuscate.

Head in facial view transverse, as in majority of species (cf. Fig. 30). Frons between antennal sockets showing as a smooth, weakly rounded boss, laterally compressed to form a single, short, rounded ridge.

Segment 3 of labial palpus fully 0·66 times as long as apical segment. In front of anterior ocellus an obsolescent, V-shaped depression. Ocelli in a low triangle, the posterior tangent to anterior ocellus virtually touching posterior pair. Antenna with 30–34 segments: 30 (5), 31(2), 34(1). Notaulices sharply defined but shallow, finely foveate throughout. Sculpture of propodeum variable, tending to fade out on each side of convexity, leaving an almost smooth area. Areolet of fore-wing almost always sharply triangular; rarely with short stalk. Inner spur of hind tibia not reaching middle of basal segment of hind tarsus; hind claw with conspicuous, angular lobe; outer side of middle tibia with 2–3 well-separated teeth. Tergite 1 about 1·66 times longer than apically wide, with fine, mostly broken rugose-striation all over; where the striation becomes weak, towards apex of tergite, surface shows a considerable amount of weak scaly-reticulation. Tergites 2+3 almost 1·5 times longer than apically wide, sculptured almost all over; distal to 2nd suture, which shows as a shallow furrow, the surface is weakly scaly-reticulate, the sculpture tending to fade out towards apical corners; basal to the suture (the area probably corresponding to the true second tergite), a weakly rugose furrow sets off the usual, transverse, slightly raised area; whole of basal half of tergites 2+3 vaguely rugose-striate with either the rugose or striate element predominating. Hypopygium sharply pointed at apex. Ovipositor sheath about equal to gaster plus thorax.

MATERIAL EXAMINED

Germany: 3 ♀, Ruthe coll. (BMNH). **Great Britain**: 2 ♀, Bucks., vii., on dead *Quercus* sp. (BMNH); 1 ♀, Essex, Epping Forest, viii.1954 (BMNH); 3 ♀, Hants., Romsey, vii.–viii.1980, from wood of dead *Larix* (*C. Vardy*) (BMNH); 1 ♀, Southsea, coll. 19.iii.1983, em. vi.1983, ex *Blastobasis lignea* in dead twigs of *Ulex* (BMNH); 1 ♀, Surrey, Mickleham, vii.1935 (BMNH). **Greece**: 1 ♀, Ilia, Olympia, vii.1979 (*Day, Else & Morgan*) (BMNH). **Ireland**: 4 ♀, Glengariff, Lodge Woods, vii.1935, on *Quercus* sp. (*A. W. Stelfox*) (BMNH). **Switzerland**: 1 ♀, Wallis, Brig, 2.vii.1959 (*E. Bauer*) (EH).

HOST. *Blastobasis lignea* Walsingham (Blastobasidae). According to Meyrick (1968), the larva of this moth feeds on dead leaf-refuse but this may also include dead wood which would explain the data given above.

COMMENTS. Though variable both in colour and sculpture, this species is highly distinctive on the sculpture of the gaster; it could not be confused with any other *Microdus* from the region.

Microdus rufipes Nees von Esenbeck

Microdus rufipes Nees von Esenbeck, 1814: 189. Syntypes, GERMANY (lost).
Braunsia rufipes (Nees von Esenbeck) Telenga, 1955: 277; Shenefelt, 1970: 375.
Microdus rufipes Nees von Esenbeck; Tobias, 1971: 260.

♂ ♀, 4–5 mm long (excluding ovipositor). Black; rarely basal third of tergites 2+3 reddish yellow (1 ♀, England: Suffolk, Sudbury). Hind coxa and hind femur bright reddish yellow; hind tibia slightly duskier than its femur and darkened on about apical third. A single female from Jugoslavia: Ristovaca has the face, mesoscutum and sides of thorax richly marked with paler colouring.

♀. Head like that of *rugulosus*. Structure of frons between antennal sockets like that of *rugulosus* but thickened keel tapering behind and uniting with a distinct V-shaped depression in front of anterior ocellus. Ocelli in a low triangle, the tangent to anterior ocellus cutting posterior pair. Antenna with 31–32 segments. Notaulices deeply impressed, much more so than in *rugulosus*. Propodeum covered with coarse, confused rugosities. Wings like those of *rugulosus* but distal abscissa of postmarginalis not longer than proximal abscissa. Outer side of middle tibia with 6–7 closely spaced teeth near apex; inner spur of hind tibia relatively longer than in *rugulosus* and almost reaching middle of basal segment of hind tarsus. Tergite 1 considerably widened towards apex, about 1·25 times longer than apically wide, strongly, evenly striate all over. Tergites 2+3 showing three transverse furrows of variable definition, its entire surface, except across surface distal to third furrow, with shiny, on the whole even, longitudinal striation. Tergites 4 and 5 sometimes with faint traces of scaly-reticulation. Ovipositor sheath about equal to length of thorax plus gaster.

♂. Like female. Rarely the striation at base of tergites 2+3 somewhat broken and transverse in direction.

MATERIAL EXAMINED

Bulgaria, Great Britain, Sweden, Turkey, Yugoslavia.

HOSTS. *Cydia pomonella* (L.) (Tortricidae); *Spilonota ocellana* (Denis & Schiffermüller) (Tortricidae); *Hedya nubiferana* (Haworth) (Tortricidae); *Gypsonoma dealbana* (Frölich) (Tortricidae). The foregoing hosts are from specimens personally examined. Tobias (1971) cites the second two and in addition gives *Rhyacionia buoliana* (Denis & Schiffermüller) (Tortricidae).

COMMENTS. This is probably the most distinct of all European species of *Microdus* and is easily recognised by the even striation of the gaster. It is because of this highly characteristic striation that Telenga (1955) transferred *rufipes* to *Braunsia* Kriechbaumer but this genus is almost exclusively Afrotropical and though characterised by a striated gaster, it has no close affinity with *Microdus*.

Microdus dimidiator Nees von Esenbeck

Microdus dimidiator Nees von Esenbeck, 1834: 146. Holotype ♀, POLAND (lost).
Agathis dimidiator (Nees von Esenbeck) Shenefelt, 1970: 329.
Microdus dimidiator Nees von Esenbeck; Tobias, 1971: 260.

♂ ♀, 4–5 mm (excluding ovipositor). Black; anterior corners of tergites 2+3 somewhat pale, the pale colouring sometimes forming a complete band across base of segment. Hind coxae usually entirely reddish yellow but sometimes becoming infuscate towards base; hind femur reddish yellow; hind tibia whitish yellow but infuscate on about apical third and with faint to absent darker ring near base. Wings almost hyaline.

♀. Head as in *rugulosus*. Between antennal sockets a gently rounded hump as in other species with sculptured gaster. Segment 3 of labial palpus poorly developed, almost moniliform and much shorter than apical segment. Posterior tangent to anterior ocellus virtually touching posterior pair. Antenna with 33–35 segments: 22 (2), 33 (1), 34 (2), 35 (2). Notaulices deeply impressed. Propodeum more coarsely and intricately rugose than in *rufipes*. Lobes of mesoscutum sometimes showing a weak, sparse punctation. Areolet of fore wing smaller than in *rufipes* and more markedly stalked. Hind spurs more powerfully built than in either *rugulosus* or *rufipes*, the inner one just reaching middle of basal segment of hind tarsus; outer side of middle tibia with 3–4 teeth arranged in a row and well separated from small cluster of teeth at extreme apex. Tergite 1 about 1·5 times longer than apically wide, longitudinally striate all over; striation close, dense, shiny. Tergites 2+3 with similar striation extending as far as second suture and here ending abruptly; distal to second suture, surface (corresponding to area of tergite 3) highly polished and sometimes showing the faintest trace of a transverse furrow. Ovipositor sheath about as long as body.

♂. Like female except for sexual differences. Tergite 1 tending to be a little longer than in female and striation of tergites 2+3 sometimes broken or obsolescent.

MATERIAL EXAMINED

France: 8 ♂, 15 ♀, Vaucluse, Mont Ventoux, bred vi.–vii.1970, 1980 ex *Tortrix viridana* L., on *Quercus* sp. (*P. du Merle*) (PdMC, 2 ♂, 5 ♀, BMNH). **Germany**: 1 ♀, Ruthe coll. (BMNH); 1 ♀, Saxony (*Reinh* . . .) (RNH). **Greece**: 1 ♂, Krausia, Oros, 4.vi.1973 (*Schach*) (RNH). **Holland**: 1 ♀ (on label 'v.Voll. Holl.') (RNH). **Poland**: 2 ♂, 3 ♀, Skierniewice, vi.–vii.1957 (1 ♀, labelled ex '*ocellana*') (*Wiackowski*) (BMNH). **Yugoslavia**: 1 ♀, Ristovaca, 8.vi.1982 (*Mihajlovic*) (BMNH).

HOSTS. *Tortrix viridana* L. (Tortricidae); *Spilonota ocellana* (Denis & Schiffermüller) (Tortricidae).

COMMENTS. The female from Yugoslavia has the hind coxa blackish throughout, and the hind femur darkened with the apex almost infuscate.

The traditional interpretation of *dimidiator* is certainly correct, for Nees von Esenbeck has carefully drawn attention to its salient features in his description. The essential character for recognising this species is the abrupt termination, at the second suture, of whatever sculpture exists on the basal half of tergites 2+3, i.e. the sculpture is sharply restricted to the surface of what is morphologically the second tergite. Further, *M. dimidiator* is more slenderly built than either *rugulosus* or *rufipes* and has noticeably longer legs.

Microdus lugubrator Ratzeburg **comb. rev.**

(Figs 57, 59, 63)

Microdus lugubrator Ratzeburg, 1852: 45. Syntypes, GERMANY (lost).
Agathis lugubrator (Ratzeburg) Fulmek, 1962: 103; Shenefelt, 1970: 341.

♂ ♀, 3·5–4·0 mm long (excluding ovipositor).

♀. Black, sometimes with paler colouring on gaster. Hind coxa deeply infuscate; hind femur dull reddish yellow; hind tibia much the same colour but faintly darkened at apex. Wings considerably darkened.

Head not strongly transverse (Fig. 63). Frons between antennal sockets weakly raised to form a single, blunt, almost knob-like keel as in *rugulosus* and *rufipes*. Antenna with 28–31 segments: 28(2), 30(2), 31(1); scape rather short (Fig. 59). Ocelli in rather a high triangle, the posterior tangent to anterior ocellus not touching posterior pair. Notaulices poorly defined, sometimes almost absent on disc. Propodeum coarsely, intricately rugose all over; sometimes with 2 fairly distinct, longitudinal keels. Legs rather thick; outer side of middle tibia with 3–4 well-spaced teeth in a row; inner spur of hind tibia not quite reaching middle of basal segment of hind tarsus. Areolet of fore-wing varying from distinctly triangular to distinctly 4-sided; distal abscissa of radius virtually straight, widely separated from stigma (Fig. 57). Gaster shorter and broader than in other species of the *rugulosus*-complex. Tergite 1 much widened to apex, about 1·25 times longer than apically wide, densely rugose-striate all over and usually with a clear indication of superimposed scaly-reticulation. Tergites 2+3 with a distinct 2nd suture and usually a curved furrow proximal to this; tergites 2+3 proximal to 2nd suture with a fine variable sculpture all over; within the slightly raised, basal area, sculpture usually shows distinct striate elements, sometimes transverse in direction; elsewhere sculpture a mixture of scaly-reticulation and fine striation; distal to 2nd suture, surface shows traces, sometimes very indistinct, of scaly-reticulation. Ovipositor sheath 0·66–0·75 times length of gaster.

♂. Gaster sometimes with dull reddish tinge. Antenna with 26–28 segments: 26(2), 28(1). In the scanty material available, gaster rather more coarsely sculptured than in female.

MATERIAL EXAMINED

France: 1 ♀, Gironde, 1936, ex *Coleophora* sp. (*J. Suire*) (BMNH); 1 ♀, Fontainebleu, viii.1936 (*A. Alston*) (BMNH). **Germany**: 1 ♀, Ruthe Coll. (BMNH). **Great Britain**: 1 ♀, Essex, Epping Forest, ex *Coleophora* case on oak bark (*Quercus* sp.), coll. 3.vii.1983, em. 25.vii.1983 (*P. J. Johnson*) (MS); 2 ♀, Hampshire, New Forest, ex *Coleophora lutipennella* Zeller or *C. flavipennella* Duponchel on *Quercus* sp., coll.28.v.1983, em.1983 (*P. H. Sterling*) (MS); 1 ♀, 1912, 1 ♀, 22.vii.1908 (*G. T. Lyle*) (BMNH); 1 ♀, Kent, Bexley, vii.1937, ex *Coleophora hemerobiella* Scopoli (*R. L. E. Ford*) (BMNH); 2 ♀, SE. London, Norwood, viii.1928 (*J. H. Lowe*) (BMNH); 1 ♀, Surrey, Ashtead, viii.1928 (*G. E. J. Nixon*) (BMNH); 1 ♀, Worcester, Trench Wood, ex *Coleophora flavipennella* Duponchel, on *Quercus* sp., coll. vi.1983, em. vii.1983 (*A. N. Simpson*) (MS). **Hungary**: 1 ♀, Budapest, Kamaraerdö, 31.vii.1976 (*J. Papp*) (HNHM); 1 ♂, Nagykovacsi, 30.vi.1973, ex *Coleophora* sp. (*Szocs J.*) (HNHM).

HOSTS. Evidently a parasite of various species of *Coleophora*: *Coleophora flavipennella* (Duponchel), *Coleophora hemerobiella* (Scopoli) and possibly *Coleophora lutipennella* (Zeller).

COMMENTS. This species is mainly characterised by its weak notaulices, sculpture of gaster and short ovipositor. Its nearest relative seems to be *fortipes* (see below).

Microdus fortipes Reinhard

(Fig. 65)

Microdus fortipes Reinhard, 1867: 356. Syntype ♀. GERMANY (MNHU) [examined].

♂ ♀, 4–5 mm long (excluding ovipositor).

♀. Hind femur entirely deep reddish in two females (Munich) but much darkened in single female from Witzenhausen; hind tibia much the same colour as hind femur but infuscate at extreme apex. Wings markedly infuscate, as in *lugubrator*. Head from above much more transverse (Fig. 65). Antenna shorter, thicker, with 23–25 segments; three preapical segments hardly longer than wide; in *lugubrator*, they are fully 1·25 times longer than wide; scape slightly longer. Thorax in profile much less elongate. Notaulices deeply impressed throughout. Propodeum with much coarser reticulate rugosity. Anella of hind wing not emitting an anal vein; in this respect markedly different from *lugubrator*; areolet of fore-wing (3 ♀, 2 ♂) always sharply triangular and sometimes with short stalk. Legs thicker than in *lugubrator*; outer side of middle tibia with a cluster of 8–10 teeth close to apex. Gaster as in *lugubrator* but tergite 1 and basal half of tergites 2+3 as far as second suture with irregular sculpture of shiny, longitudinal striation; on basal part of tergites 2+3 the striation tends to be concentric around a mid-basal area and towards sides shows weakly superimposed scaly-reticulation; distal to second suture, tergites 2+3 mainly polished with faint traces of scaly-reticulation and a transverse linear impression across middle. Ovipositor sheath almost as long as gaster plus propodeum; seen from above, hairs of apical fifth of ovipositor sheath shorter and less noticeable than in *lugubrator*.

♂. Like female except for sexual differences. Sculpture of gaster reduced; that on tergites 2+3 almost obliterated.

MATERIAL EXAMINED

Germany: 2 ♀, München (*Buchecker*) (BMNH); 2 ♂, 1 ♀, Witzenhausen, viii.–ix.1965 (*Haeselbarth*) (EH).

HOST. According to Reinhard this species was bred frequently by Bouché from *Spilonota ocellana* (Denis & Schiffermüller) (Tortricidae).

COMMENTS. *Microdus fortipes* is perhaps more closely related to *lugubrator* than to any other species from the region. From *lugubrator* it is distinguished mainly by the more transverse head, the sculpture of the gaster and the much more deeply impressed notaulices. In *lugubrator* the sculpture of the basal half of tergites 2+3 presents a dull, vaguely scaly-reticulate appearance in which longitudinal elements are poorly defined; in *fortipes*, on the other hand, the sculpture here is predominantly strong, longitudinal striation.

Microdus pumilus Ratzeburg

Microdus pumilus Ratzeburg, 1844*b*: 57. Syntypes, GERMANY (lost).
Agathis pumila (Ratzeburg) Shenefelt, 1970: 350.
Microdus pumilus Ratzeburg: Tobias, 1971: 260.

♂ ♀, *ca* 2 mm (excluding ovipositor).

♀. Black. Hind femur deeply infuscate; hind tibia whitish on basal half with darkened subbasal band, infuscate on apical half.

Head rather deep from back to front, as seen from above; much as in *lugubrator* (*cf.* Fig. 63). Ocelli in a high triangle, the posterior tangent to anterior ocellus passing far in front of posterior pair. Face having a shiny, convex, polished appearance. Frons between antennal sockets raised at middle to form a knob that is slightly lengthened in direction of anterior ocellus; in this respect similar to the *rugulosus*-group. Palpi short; segment 4 of maxillary palpus much shorter than 5. Notaulices shallow, sometimes fading out before reaching posterior fovea. Sternaulus shallow, broken, isolated and not reaching back as far as posterior corner of mesopleurum. Hind spurs weak, subequal, the inner one not reaching middle of basal segment of hind tarsus. Stigma rather broad; apical abscissa of postmarginalis considerably shorter than proximal abscissa. Outer side of middle tibia with 2–3 teeth, difficult to see because of infuscation of tibia; hind claw small but with distinct lobe. Gaster somewhat short; tergite 1 triangularly widened to apex, about 1·33 times longer than its apical width; delicately, somewhat brokenly, longitudinally striate. Ovipositor sheath about 0·66 times as long as gaster, shorter than in any other species from the region.

♂. Like female except for sexual differences. Antenna with 27 segments.

MATERIAL EXAMINED

Germany: 1 ♂, 6 ♀, S.-Holstein, Segeberg, ex *Coleophora laricella* Hübner (*T. Weber*) (EH). **Holland**: 1 ♀, Bergentheim, 9.vii.1975 (*B. v. Aartsen*) (RNH).

HOST. *Coleophora laricella* (Hübner) (Coleophoridae). This host, according to Meyrick (1968), is restricted to *Larix* (see discussion under 'Biology').

COMMENTS. This is the smallest species from the region and is most distinctive on account of its very short ovipositor. It stands apart from the other species with polished tergites (except tergite 1) because of the structure of the frons between the antennal insertions.

Microdus cingulipes Nees von Esenbeck

(Fig. 55)

Microdus cingulipes Nees von Esenbeck, 1814: 189. Syntypes, GERMANY (lost).

Wesmael (1837: 18) was the first reviser of *cingulipes*; I have based my interpretation of the species on a specimen in Wesmael's collection bearing his handwritten identification label.

♀, 3·5–4·0 mm (excluding ovipositor). Black. Hind femur black; hind tibia obscurely whitish yellow at middle; deeply infuscate on apical two-fifths and with ring of infuscation near base.

Head in facial view as transverse as in majority of species; seen from above strongly transverse. Antennal sockets on their inner side joined to form a weakly bipartite projection. Ocelli in low triangle, the posterior tangent to anterior ocellus virtually touching posterior pair. Labial palpus with only 3 clearly visible segments. Antenna with 29–31 segments. Notaulices deeply impressed throughout, sometimes forming patch of rugosity where they unite behind. Sternaulus distinct throughout but narrow, linear and at most finely rugose. Propodeum rugose all over but showing no special feature. Hind spurs rather weak; inner spur of hind tibia falling far short of middle of basal segment of hind tarsus; outer side of middle tibia with 2–3 teeth just proximal to apical cluster of 3–4 teeth. Radius colourless over middle third, strongly bent inwards towards stigma and, where closest to this, separated from it by about thickness of radius itself (Fig.

55); stigma shorter and less wedge-shaped than in *tumidulus* and close allies. Tergite 1 1·50–1·66 times longer than its apical width, somewhat weakly striate all over. Tergites 2+3 basal to 2nd suture with usual, curved furrow, delimiting a transversely elliptical area; rarely this furrow finely costate; gaster otherwise smooth, polished. Ovipositor sheath about as long as thorax plus gaster.

MATERIAL EXAMINED

Belgium: 1 ♀, Wesmael coll. (IRSNB). **Germany**: 2 ♂, Ruthe coll. (BMNH); 5 ♀, Oberbayern, Hochstadt, vii.–viii. (*Haeselbarth*) (EH); 1 ♀, Oberbiberg, 2.vii.1969 (*Haeselbarth*) (EH); 1 ♀, Wessling, 7.viii.1972 (*Haeselbarth*) (EH); 1 ♀, Glonn, 14.vii.1968 (*Haeselbarth*) (EH). **Great Britain**: 1 ♀, Hampshire, Havant Thicket, ex *Epinotia fraternella* Douglas on *Abies grandis*, collected 10.xi.1977, emerged iii.1978 (*Langmaid*) (MS); 1 ♀, Essex, Saffron Walden, ix.1966, ex *Coleophora frischella* L. (*Emmet*) (AA); 1 ♀, Yorkshire, Langdale, on *Pinus* (*Day*) (BMNH). **Ireland**: 2 ♀, Co. Down, Tollymore Park, vii.1961 (*Stelfox*) (USNM); 1 ♀, Dublin, Glenasmole, viii.1944 (*Stelfox*) (USNM). **Italy**: 1 ♀, Südtirol, St Peter Ahrntal, viii.1967 (*Haeselbarth*) (EH).

HOSTS. *Caryocolum fraternella* Douglas (Gelechiidae); *Coleophora frischella* (L.) (Coleophoridae).

COMMENTS. This is a very distinctive species, largely characterised by the deeply incurved radius. It seems to be closely related to the following species but there is no possibility of confusing the two.

Microdus nugax Reinhard

(Fig. 54)

Microdus nugax Reinhard, 1867: 354. Syntype ♀, GERMANY (MNHU) [examined].
Agathis nugax (Reinhard) Shenefelt, 1970: 347.
Microdus nugax Reinhard; Tobias, 1971: 260.

♂ ♀, 3·5–4·0 mm (excluding ovipositor).

♀. Very close to *cingulipes* with which it may be compared as follows. Paler part of hind tibia obscurely brownish red with virtually no trace of a darkened, basal ring; hind femur varying from obscurely brownish red to entirely infuscate; hind spurs darker.

Head from above slightly less transverse, deeper from back to front. Face polished, convex, virtually impunctate. Ocelli slightly smaller; posterior tangent to anterior ocellus passing freely in front of posterior pair. Preapical segment (3rd) of labial palpus so small as to be virtually absent. Antenna with fewer segments: 23–26; 23 (1), 24 (3), 25 (4), 26 (1). Thorax more elongate. Notaulices characteristically weak, sometimes not or hardly indicated posteriorly. Hind spurs less well developed. Radius only slightly bent but pale along middle stretch (Fig. 54) as in *cingulipes*. Tergite 1 a little less elongate, its sculpture considerably weaker. Ovipositor sheath a little shorter; seen from above, with denser, more closely set hairs that on apical third of sheath do not noticeably project.

♂. Like female except for sexual differences.

MATERIAL EXAMINED

Italy: 4 ♂, 3 ♀, Südtirol, Algund, 1900 m, 24.vii.1966 (*Haeselbarth*) (EH; 1 ♂, 1 ♀ in BMNH); 2 ♂, 1 ♀, Karthaus, 1200 m, 14.vii.1976 (*Haeselbarth*) (EH); 3 ♂, 2 ♀, Marling, 1200 m, 12.vii.1966 (*Haeselbarth*) (EH; 1 ♂, 1 ♀ in BMNH); 2 ♀, St Peter/Ahrntal, vii.–viii. (*Haeselbarth*) (EH); 1 ♀, Campi, Riva s. Garda, 1400 m, 7.vii.1976 (*Haeselbarth*) (EH).

HOST. Unknown.

COMMENTS. A small, obscurely coloured species, essentially characterised by the weakly developed notaulices and the shape of the radial cell.

Microdus eriphyle sp. n.

(Figs 56, 62, 64)

♀, 4 mm (excluding ovipositor). Black. Hind femur black; hind tibia obscurely whitish yellow, infuscate in apical third and with a broad infuscate prebasal band.

Head from in front as transverse as in majority of species; seen from above as in Fig. 64. Antennal sockets unusually deep; seen from above frons between sockets very slightly concave. Behind frontal ridge and towards anterior ocellus a very short, almost tuberculiform keel. Ocelli in a high triangle, the posterior tangent to anterior ocellus passing in front of posterior pair. Preapical segment of labial palpus (3rd) well developed, clearly longer than wide. Notaulices deeply impressed throughout, smooth, uniting posteriorly to form an elongate, smooth furrow. Propodeum appearing smooth, shiny, its sculpture very weak and in one female (paratype) almost absent. Radius of fore-wing strongly incurved but not so much as in *cingulipes* (*cf.* Fig. 55), evenly pigmented throughout. Outer side of middle tibia with a row of 4 teeth, widely spaced and linking up with 2 at extreme apex of tibia; inner spur of hind tibia not quite reaching middle of basal segment of hind tarsus; claws of all legs powerful; lobe almost as long as claw proper, a very deep cleft between it and claw proper (Fig. 54). Gaster unusually long and narrow (Fig. 62). Tergite 1 about twice as long as its apical width, shiny, with a weak, almost shagreened sculpture in which longitudinal elements are virtually absent. Basal half of tergites 2+3 with faint traces of scaly-reticulation distal to the hardly indicated curved furrow common to all species. Ovipositor sheath about as long as gaster plus propodeum; bristle-like hairs towards apex of sheath not different from those elsewhere. Hypopygium long, sharply pointed.

MATERIAL EXAMINED

Holotype ♀, **Greece**: Ilia, Olympia, 4–11.vii.1979 (*Day, Else & Morgan*) (BMNH).
Paratype. 1 ♀, same data.

HOST. Unknown.

COMMENTS. This is an elegant species, differing in several significant characters from the other *Microdus* species dealt with in this revision. Particularly characteristic is the sculpture of the first gastral tergite. This, and the bend of the radius, suggest some affinity with *Baeognatha* Kokujev but this genus differs in not having a closed areolet in the fore-wing. It is possible that the loss of the second transverse vein in *Baeognatha* is apomorphic and in itself does not preclude a relationship with *Microdus eriphyle*.

Microdus linguarius Nees von Esenbeck

(Figs 32, 66)

Microdus linguarius Nees von Esenbeck, 1814: 190. Syntypes, GERMANY (lost).
Agathis linguarius (Nees von Esenbeck), Shenefelt, 1970: 340.
Microdus linguarius Nees von Esenbeck, Tobias, 1971: 260.

Marshall (1885: 270) was the first reviser of *linguarius* and I have no doubt that his interpretation is correct. Nees von Esenbeck's description is also explicit on the details that define *linguarius*.

♂ ♀, 5·0–5·5 mm (excluding ovipositor).

♀. Black. Basal half of tergites 2+3 frequently marked with reddish; sometimes whole surface reddish except for a large, isolated, elliptical black patch at base; more often pale colouring restricted to a lateral mark on each margin and sometimes whole of tergites 2+3 black. Hind femur red; hind tibia reddish but infuscate on about apical quarter.

Head from in front distinctly lengthened (Fig. 32). Inner margin of each antennal socket produced to form an angular tooth. Antenna with 28–31 segments, usually 30. Preapical segment of labial palpus (3rd) well developed, slightly longer than wide. Notaulices well defined throughout. Sternaulus of usual form. Propodeum coarsely rugose-reticulate all over; in this respect, somewhat uncharacteristic of genus; frequently with 2 indistinct, longitudinal keels. Radius of fore-wing slightly bent inwards towards stigma; areolet triangular or even stalked; stigma shorter than in *clausthalianus* but hardly different from that of *tumidulus*. Prepectal margin strongly raised, with knife-like edge. Outer side of middle tibia with 1–3 isolated teeth in about apical third. Gaster less elongate than in *clausthalianus*, much as in *tumidulus*. Tergite 1 only a little longer than apically wide, finely striated to within about apical third where striations fade and give way to a broad, transverse band of setiferous punctures. Hairs of tergites somewhat characteristically short so that gaster has an almost bare, highly polished appearance. Ovipositor sheath fully 1·25 times longer than body. Hypopygium widely, moderately deeply emarginate at apex; in profile appearing markedly truncate (Fig. 66), rather sparsely hairy.

♂. Antenna with 28–29 segments. Gaster sometimes entirely black. Striation of tergite 1 more variable in intensity than in female, sometimes almost wanting.

MATERIAL EXAMINED

Great Britain: 1 ♀, Berkshire, Boxmoor, 29–30.vii.1933 (*R. B. Benson*) (BMNH); 1 ♂, Buckinghamshire, Gog Magog Hills, 27.vii.1937 (*R. L. E. Ford*) (BMNH); 1 ♀, Devon, Chudleigh, 14.viii.1935 (*J. F. Perkins*) (BMNH); 1 ♀, Hampshire, Portsdown, 4.viii.1956 (*J. Clark*) (BMNH); 1 ♀, I. of Wight, Cowes, 20.xi.1938 (*R. C. L. Perkins*) (BMNH); 1 ♂, Kent, Shoreham, 15.viii.1958 (*R. L. E. Ford*) (BMNH); 1 ♂, 1 ♀, Surrey, Banstead (*D. Clark*) (BMNH); 49 ♀, Hackhurst Downs, 27–28.viii.1982 (*A. A. Allen*) (AA, 12 in BMNH); 2 ♂, Sussex, Stonecross, 26.vii.1946 (*R. L. E. Ford*) (BMNH). **Hungary**: 1 ♂, 1 ♀, Baranya-megya, Nagyharsane, vii.1963 (*L. Zombori*) (HNHM); 1 ♀, Somberek, 22.vii.1964 (*L. Zombori*) (HNHM); 10 ♀, 3 ♂, Kam, Jeli arboretum (*J. Papp*) (HNHM); 2 ♀, Keszthely, vii.1977 (*J. Papp*); 1 ♂, 1 ♀, Bajánsenye, 16.viii.1977 (*J. Papp*) (HNHM); 1 ♀, Fót.Rét, 16.viii.1960 (*Mihalyi*) (HNHM).

HOST. Unknown.

COMMENTS. This is an easily recognised species and is characterised by the relatively elongate head, as seen from in front, the angular projection of the inner margin of the antennal socket and, in the female, especially by the emarginate hypopygium. This last feature is diagnostic for *linguarius* and it is unknown in other species from the region.

Dates of capture for the numerous examples examined indicate that *linguarius* occurs only in July and August; it is probably single brooded.

Microdus clausthalianus (Ratzeburg)

Ichneumon (Microdus) clausthalianus Ratzeburg, 1844*a*: 25. Holotype ♀, GERMANY (lost).
Microdus clausthalianus (Ratzeburg) Ratzeburg, 1844*b*: 58.
Agathis clausthalianus (Ratzeburg) Kloet & Hincks, 1945: 234: Shenefelt, 1970: 326.
Microdus clausthalianus (Ratzeburg) Tobias, 1971: 260.

♂ ♀, 6·0–6·2 mm (excluding ovipositor).

♀. Black, rarely with a pale mark against and behind eye. Hind femur always entirely reddish; hind tibia usually same colour except for weak infuscation in apical quarter; but sometimes hind tibia faintly yellowish and contrasting with red femur and, when thus pale, then with faint, prebasal band of infuscation; a pale-coloured hind tibia always correlated with an entirely red hind coxa; hind coxa varying from entirely red to entirely black. Labrum and mandible varying from entirely yellowish to obscure brownish red, or even black (exs. from Sweden: Skåne, Fjellfota sjö).

Face punctate but punctation variable in intensity; when weak, face more shiny. Antennal sockets almost completely margined behind. Ocelli somewhat variable in size; when largest, they are in a low triangle with posterior tangent to the anterior ocellus touching posterior pair and distance between anterior and posterior ocellus less than diameter of ocellus. Prepapical segment of labial palpus (3rd) about as long as wide. Antenna with 37–40 segments in examples with red hind coxa: 37 (4), 38 (7), 39 (4), 40 (2); with 33–36 segments in examples with blackened hind coxa; 33 (1), 34 (1), 35 (5), 36 (1). Mesoscutum somewhat elongate. Notaulices deeply impressed throughout. Sternaulus extending forwards almost exactly to middle of mesopleurum. Radial cell markedly elongate. Outer side of middle tibia with 3–4 teeth in a row. Gaster elongate, more so than in the *tumidulus*-aggregate. Tergite 1 with weak, longitudinal striation which is frequently so weak as to be almost absent. Ovipositor sheath fully as long as body.

♂. Like female except for sexual differences.

MATERIAL EXAMINED

Germany, Great Britain, Holland, Ireland.

HOST. *Epiblema scutulana* (Denis & Schiffermüller) (Tortricidae) (1 ♀, ex stem of *Cirsium*, 17.iv.1979 (*P. R. Sokoloff*) (MS); 1 ♀, Berwick, Oxton, ex stem of thistle sp., 10.iii.1979 (*K. Bland*) (MS)).

COMMENTS. Most specimens of *clausthalianus* are fairly easily recognised by their slender form and long ovipositor. Smaller examples are sometimes hard to separate from *tumidulus* (s.l.). A prolonged study of both species has failed to reveal the limits of the range of variation in either.

Microdus tumidulus Nees von Esenbeck

(Fig. 58)

Microdus tumidulus Nees von Esenbeck, 1814: 189. Syntypes, GERMANY (lost).
Microdus tegularis Thomson, 1895: 2231. LECTOTYPE ♀, SWEDEN: Palsjö (ZI), here designated [examined]. **Syn. n.**
Agathis tumidulus (Nees von Esenbeck) Shenefelt, 1970: 362.
Microdus tumidulus Nees von Esenbeck; Tobias, 1971: 260.

This species is very like *clausthalianus*. The main differences between the two species have been given in the key; there is very little to add.

♀. Hind coxa mostly black, rarely entirely red. Antennal sockets unmargined behind; surface between sockets virtually smooth except for a weakly impressed, median, longitudinal groove. Antenna with 27–30 segments. Sternaulus ending at middle of mesopleurum. Hind femur stouter than in *clausthalianus*, 3 times as long as greatest width; outer side of middle tibia with 2–4 teeth towards apex, in addition to small cluster of teeth at extreme apex. Fore-wing (Fig. 58). Ovipositor sheath equal to length of gaster plus propodeum.

♂. Like female except for sexual differences.

MATERIAL EXAMINED

France, Germany, Great Britain, Greece, Ireland, Italy, Yugoslavia.

HOST. *Dichrorhampha acuminatana* (*Lienig & Zeller*) (Tortricidae). Reinhard (1867: 354) records *tumidulus* as having been bred from the pupae of this moth (under the name *Phthoroblastis acuminatana*) in August on *Chrysanthemum leucanthemum* L.

COMMENTS. This species, which may be an aggregate, has been correctly interpreted (s.l.) by all major workers on *Microdus*. It is easily recognised by the pale mark behind the eyes – a striking example of constancy in a colour-character.

The notes given above cover the majority of the specimens examined, including Thomson's *tegularis*. There is, however, a series of 13 specimens in BMNH that, in certain respects, are intermediate between *tumidulus* and *clausthalianus*. On the whole the habitus is more slender than that of typical *tumidulus* and the ovipositor is longer, almost as long as the whole body. The antennal sockets are sometimes completely margined behind, sometimes smooth and evenly hollowed out; the surface between the sockets is usually raised in the form of an evenly rugose platform but more often the surface here is weakly bipartite, being divided by a feeble channel. Antenna with 29–33 segments. The material is from the following localities. Germany: 4 ♀, Ruthe coll. (BMNH). Great Britain: 1 ♀, Surrey, Banstead, 29.vi.1952 (BMNH); 1 ♀, Hampshire, Stockbridge, 15.vi.1953 (*R. L. E. Ford*) (BMNH). France: 1 ♀, Pyrénées-Orientales, Vernet-les-Bains, 20.vi.1963 (BMNH). Sweden: 1 ♀, Skåne, Silvakra, viii.1976 (*T. Huddleston & J. Quinlan*) (BMNH); 4 ♀, Upsala, Solna, viii.1976 (*T. H. & J. Q.*) (BMNH); these last mentioned 4 specimens have the hind tarsus markedly blackened and the area between the antennal sockets showing maximum rugosity. Switzerland: 1 ♀, St Gall, Lake Zürich, ix.1951 (BMNH).

Microdus conspicuus Wesmael

(Figs 30, 61)

Microdus conspicuus Wesmael, 1837: 17. LECTOTYPE ♀, BELGIUM: Brussels, Wesmael coll. (IRSNB), here designated [examined].
Microdus arcuatus Reinhard, 1867: 353. Syntype ♂, GERMANY (MNHU) [examined]. **Syn. n.**
Earinus zonatus Marshall, 1885: 268. Syntypes, GREAT BRITAIN (lost). [Synonymised by Lyle, 1920: 184.]
Agathis conspicua (Wesmael) Muesebeck & Walkley, 1951: 119.
Microdus conspicuus Wesmael; Tobias, 1976*b*: 98.

♂ ♀, 5·0–5·5 mm long (excluding ovipositor). Black; greater part of gaster bright reddish yellow. Legs almost entirely reddish yellow; hind coxa black; hind femur entirely reddish yellow. Antenna of ♀ pale beneath on more than basal half. In the male, base of tergites 2+3 sometimes with a blackened patch, and three apical tergites may also be darkened.

♀. Head in facial view strongly transverse. Third segment of labial palpus hardly discernible. Antenna with 34–35 segments. Notaulices deeply impressed throughout. Sternaulus rugose. Propodeum usually with two discernible keels but these usually obscured by coarse rugosities. Radius of fore-wing markedly bent inwards towards stigma and here tending to be colourless (Fig. 61); areolet sharply triangular and often with conspicuous stalk. Outer side of middle tibia in apical half with group of 5–8 thick teeth; inner spur of hind tibia not quite reaching middle of basal segment of hind tarsus. Gaster as in *tumidulus*. Tergite 1 about 1·33 times longer than its apical width; finely, evenly striate all over, the surface appearing very shiny; basal half of tergites 2+3 sometimes with traces of fine rugose-striation tending to be concentric around the feebly raised, transverse, basal swelling. Apical sternite (hypopygium) evenly pointed at apex. Ovipositor sheaths a little shorter than body.

♂. Gaster somewhat darker than in female. Sometimes eye-orbits, both on inner side and temples, paler in colour.

MATERIAL EXAMINED

Belgium, Finland, France, Great Britain, Hungary, Ireland, Italy, Sweden, Switzerland.

HOSTS. Shenefelt (1970) lists the following: *Conchylis nitidulana* Zeller (?? *Gypsonoma nitidulana* Lienig & Zeller) (Tortricidae); *Pammene regiana* (Zeller) (Tortricidae); *Cydia molesta* Busck (Tortricidae), a species which, according to Meyrick (1968: 590) has been introduced into North America, Australia and Europe.

Bred specimens from *Cydia pomonella* (L.), *Pammene regiana* (Zeller) and *Rhopobota ustomaculana* (Curtis) (all Tortricidae) have been examined. It seems that Tortricidae are the main, if not the only, hosts.

COMMENTS. This species has some economic importance because of its parasitism on *Cydia pomonella* the Codling moth. As a species it is chiefly characterised by its bright colour and bent radius. Nevertheless, it bears a strong superficial resemblance to *zaykovi* but the latter has a differently shaped head, both in facial view and profile.

Microdus zaykovi sp. n.

♂ ♀, 4·5–5·0 mm (excluding ovipositor). Black. Gaster, except for 1st tergite, reddish yellow but surface becoming slightly infuscate on posterior half in the paratype. Hind coxa black; hind femur red; hind tibia hardly paler than hind femur and faintly darkened only at extreme apex. Wings deeply infuscate.

♀. Head in facial view like that of *linguarius* (*cf.* Fig. 32); in lateral view, hind margin of head deeply hollowed out at a point level with lowest point of eye; in same view of head, cheeks behind markedly angled. Surface between antennal sockets virtually flat; no trace of a projection on inner side of antennal socket as in *linguarius*. Antennal scrobes broader than in *linguarius*, reaching close to inner eye-margin and much closer to posterior ocellus. Posterior tangent to the anterior ocellus passing far in front of posterior pair in the paratype; almost touching them in the holotype. Mesoscutum and notaulices of ordinary form. Sternaulus reaching middle of mesopleurum. Radius of fore-wing slightly more strongly curved inwards towards stigma than in *linguarius*, with stigma more narrowed towards apex and radial cell slightly longer than in that species. Outer side of middle tibia with one tooth at extreme apex in holotype, just behind the 2–3 closely spaced teeth at the edge; no preapical teeth in the paratype; hind tarsus with apical lobe smaller than in *linguarius*, the claw itself hence appearing longer and less curved. Gaster rather short and broad; tergite 1 considerably widened towards apex, about 1·25 times longer than its apical width; on posterior half almost smooth and polished in the two females available. Hypopygium not emarginate at apex and in profile angled at about 60 degrees. Ovipositor sheath much shorter than in *linguarius*, hardly as long as thorax and gaster combined.

♂. Like the female in all essential details but apical half of gaster blackened. In one of the two paratypes, there is a large pale oblong spot behind the eye (much as in *tumidulus*). Colour probably variable.

MATERIAL EXAMINED

Holotype ♀, **Bulgaria**: Rhodope, Nikolovo, 19.viii.1976 (*Zaykov*) (ZC).

Paratypes. **Bulgaria**: 1 ♀, Rhodopi, 'h.Ruen', 29.vii.1960 (*A. Germanov*) (BMNH); 1 ♂, Nikolovo, 15.viii.1976 (*Zaykov*) (ZC); 1 ♂, Bojno, 24.vii.1975 (*Zaykov*) (ZC).

COMMENTS. The most characteristic feature of this very dark-winged species is the hollowing out of the back of the head when this is seen in profile. In colour it bears a superficial resemblance to *conspicuus* under which the differences are pointed out.

EARINUS Wesmael

Earinus Wesmael, 1837: 8. Type-species: *Microdus nitidulus* Nees von Esenbeck (= *elator* (Fabricius)), by subsequent designation (Muesebeck & Walkley, 1951: 116).

DIAGNOSIS. Head in facial view not lengthened, like that of *Microdus*. Third segment of labial palpus virtually twice as long as wide. Ocelli in low triangle; posterior tangent to anterior ocellus cutting posterior pair. Notaulices absent but mesoscutum behind with elongate furrow. Sternaulus absent. First discoidal cell separated from 1st cubital cell by a fully pigmented, sclerotised vein; areolet of fore-wing 4-sided. Outer side of middle tibia with row of 4–6 teeth; outer side of front tibia with at least one tooth. Metasternum behind not completely surrounding hind coxal insertion. Ovipositor in the three species under consideration not longer than gaster plus propodeum.

Key to species (females)

1 Head and thorax densely hairy; face strongly, conspicuously punctate, somewhat flattened on each side of a broad, longitudinal ridge; mesoscutum usually black but sometimes reddened **elator** (Fabricius) (p. 227)

– Head and thorax with ordinary pubescence; face shiny and at most with fine punctation; a longitudinal, facial ridge hardly indicated 2

2 Ovipositor sheath two-thirds as long as gaster; hairs of ovipositor sheath longer, thicker, more bristly .... ***transversus*** Lyle (p. 228)

– Ovipositor sheath about as long as gaster plus propodeum; hairs of ovipositor sheath shorter, thinner, less bristly .... ***gloriatorius*** (Panzer) (p. 227)

Earinus elator (Fabricius)

Banchus elator Fabricius, 1804: 128. Lectotype ♂, AUSTRIA (ZM), designated by Fitton, 1985 [examined].
Microdus nitidulus Nees von Esenbeck, 1814: 187. Syntypes, GERMANY (lost). **Syn. n.**
Microdus thoracicus Nees von Esenbeck, 1834: 143. Syntypes, GERMANY (lost). **Syn. n.**
Earinus nitidulus (Nees von Esenbeck) Reinhard, 1867: 351.
Earinus thoracicus (Nees von Esenbeck) Shenefelt, 1970: 407.

♂ ♀, 7–8 mm long (excluding ovipositor).

♀. Black but mesoscutum sometimes reddened. Legs entirely red except for infuscate hind tarsi. At least the two apical segments of maxillary palpus yellowish.

Head characteristically clothed with long pubescence. Face conspicuously punctate, the punctures tending to be separated by slightly less than their diameter. Antennal sockets united on inner side to form a raised, hump-like area, densely punctate. Scrobes with some rugose-punctation. Antenna with 36–40 segments. Thorax densely hairy. Mesoscutum sharply, distinctly punctate. Mesopleurum closely, sharply punctate, thickly pubescent over almost entire surface. Propodeum at middle with 2–3 very irregular, longitudinal keels; surface on each side of keels tends to be smooth and polished. Areolet of fore-wing subquadrate, large, frequently with extra vein in form of stub arising from middle of outer side of 2nd cubital vein; distal abscissa of postmarginalis about 0·5 times as long as proximal abscissa. Outer side of middle tibia with 3–4 teeth arranged in row; front tibia with 4–5 teeth along outer side; inner spur of hind tibia slightly less than half as long as basal segment of hind tarsus. Gaster, except for tergite 1 which is vaguely rugose-punctate to rugose-striate, highly polished and only very sparsely hairy; ventral surface and laterotergites by contrast thickly hairy. Ovipositor sheaths about as long as gaster plus propodeum, densely beset with thick, bristle-like setae.

♂. Like female except for sexual differences.

MATERIAL EXAMINED
Austria: 2 ♂ (including lectotype), Fabricius coll. (ZM), **Germany**: 3 ♂, 2 ♀, Ruthe coll. (BMNH); 2 ♀, Celle, 23.v.1942 (BMNH). **Great Britain**: 1 ♀, Berkshire, Woolhampton, ex *Agrochola lota* Clerck, coll. 30.v.1978, em. 22.iv.1979 (*M. Shaw*) (MS); 1 ♀, Devon, Dartmoor, 23.iv.1924 (*J. F. Perkins*) (BMNH); 2 ♀, Newton Abbott, 28.iv.1928 (*R. C. L. Perkins*) (BMNH); 1 ♀, Tiverton (*F. H. Lyon*) (BMNH); 2 ♀, Hertfordshire, Brickett Wood, 24.iv.1948 (*R. B. Benson*) (BMNH), 1 ♂, Aldbury, 2.iv.1949 (*R. B. Benson*) (BMNH); 2 ♀, Lancashire, nr Nutford, Hawes Wood, ex *Agrochola circellaris* (Hufnagel) in *Salix* catkins, coll. 7.iv.1977, em. 19.iii.1978 (*M. Shaw*) (MS); 1 ♂, Shropshire, Church Stretton (*D. K. Mckevan*) (BMNH); 8 ♂, 5 ♀, Surrey, Salfords, beaten from privet (*Ligustrum*), 15.iii.1981 (*A. A. Allen*) (AA; BMNH); 1 ♂, 3 ♀, Sussex, Plaistow, King's Park Wood, ex *Agrochola lota* Clerk on *Salix caprea*, coll. 20.v.1978, em. 19.iv.1979 (*M. Shaw*) (MS); 1 ♀, Sussex (no other loc.), ex *Orthosia xerampelina* Hübner (BMNH); 2 ♀, Lothian, Edinburgh, 16.iv.1981 (BMNH). **Ireland**: 1 ♂, Dublin, Glenasmole, 5.iv.1936 (*Stelfox*) (USNM); 1 ♂, Wicklow, Glencullen, 25.iii.1932 (*Stelfox*) (USNM). **Sweden**: 2 ♀, Skåne, 28–30.iv.1938 (*Perkins*) (BMNH).

HOSTS. *Agrochola circellaris* (Hufnagel); *Agrochola lota* Clerck on *Salix caprea*; *Atethmia centrago* (Haworth) (all Noctuidae). The stout cocoon of the parasite is barrel-shaped, white, papery. All the above records indicate that *elator* is single-brooded and occurs from March to May.

COMMENTS. This is a very distinct species on account of its unusual hairiness and the thick setae of the female ovipositor sheaths. Females with a red mesoscutum are particularly easy to recognise.

Earinus gloriatorius (Panzer)

(Figs 67, 68)

Bassus gloriatorius Panzer, 1809: 102. Syntypes, GERMANY (lost).
Microdus ochropes Curtis, 1829: 105. Nomen nudum. [See *ochropes* Lyle, 1920.]
Microdus gloriatorius (Panzer) Haliday, 1833; 263. [First reviser.]
Earinus gloriatorius (Panzer) Haliday *in* Westwood, 1839: 63.
Microdus affinis Wesmael, 1837: 11. LECTOTYPE ♀, BELGIUM: Brussels, Wesmael coll. (IRSNB), here designated [examined]. [Synonymised by Marshall, 1885: 267.]

Microdus varicoxis Wesmael, 1837: 10. LECTOTYPE ♀, BELGIUM: Brussels, Wesmael coll. (IRSNB), here designated [examined]. **Syn. n.**

Microdus delusor Wesmael, 1837: 12. LECTOTYPE ♀, BELGIUM: Brussels, Wesmael coll. (IRSNB), here designated [examined]. **Syn. n.**

Microdus tuberculatus Wesmael, 1837: 13. LECTOTYPE ♀, BELGIUM: Brussels, Wesmael coll. (IRSNB), here designated [examined]. **Syn. n.**

Agathis bicingulatus Thomson, 1895: 2234. LECTOTYPE ♀, SWEDEN: Örtofta, Thomson coll. (ZI), here designated [examined]. **Syn. n.**

Earinus ochropes Lyle, 1920: 248. LECTOTYPE ♀, GREAT BRITAIN (*Dale*) (UM), here designated [examined]. [Attributed to Curtis, 1829.] **Syn. n.**

♂ ♀, *ca* 5 mm (excluding ovipositor).

♀. Black. Hind coxa almost always red, sometimes bicoloured, rarely entirely black; hind tibia sometimes yellowish with infuscate apex and infuscate basal ring; more often reddish throughout. Face smooth, shining, rarely with traces of punctation towards antennal insertions. Antennal scrobes polished, smooth. Antenna with 32–36 segments. Mesoscutum with only moderately thick pubescence. Virtually no trace of notaulices but usually mesoscutum with a longitudinal furrow posteriorly. Prepectal margin almost obliterated medially. Propodeum on the whole smooth, shining and with two longitudinal keels of variable strength; lateral panels sparsely hairy. Areolet of fore-wing always distinctly 4-sided; usually somewhat narrowed towards stigma (Figs 67, 68); rarely more obviously quadrate and with an accessory vein arising from middle of outside of 2nd transverse cubitus as in *elator*. Claws of hind tarsus more strongly bent than in *elator* and with deeper lobe; middle tibia with 3–4 teeth on outer side; fore tibia with 3–4 teeth on outer side. Tergite 1 about 1·33 times longer than its apical width; vaguely sculptured on apical half but sculpture varying much in intensity. Tergites 2+3 with variable sculpture; at base usually with a more or less distinct, transversely triangular area that is slightly raised and generally smooth and shining; distal to this area and as far as second suture, the amount of sculpture is highly variable; sometimes it appears as fine rugosity, sometimes as rugose-striation; sometimes whole of tergites 2+3 entirely smooth. Ovipositor sheath about as long as gaster plus propodeum; its setae much less thickened than in *elator* and, towards apex, shorter, finer and more adpressed.

♂. Like female except for sexual differences.

MATERIAL EXAMINED

Belgium, Germany, Great Britain, Holland, Hungary, Ireland, Sweden, Switzerland.

HOST. *Agonopteryx ciliella* (Stainton) or *Agonopteryx heracliana* (L.) (Oecophoridae) on *Angelica sylvestris* L. (MS).

COMMENTS. *Earinus gloriatorius* is an abundant species but shows a confusing variation in the colour of the hind legs and the rugosity of the gaster. Like *elator*, with which it could not be confused, it occurs in spring. Wesmael's three species synonymised above and about whose separate validity he had some misgivings are recorded by him as having been captured towards the end of April.

Earinus transversus Lyle

Earinus transversus Lyle, 1920: 249. LECTOTYPE ♀; GREAT BRITAIN (*Dale*) (UM), here designated [examined].

♀, 6·5 mm long (excluding ovipositor). Black. Hind coxa and hind femur red; hind tibia bright yellow, deeply infuscate in apical third and with faint post-basal infuscate spot; hind tarsus deeply infuscate throughout.

Face smooth, shining, finely punctate. Antennal scrobes polished. Antenna with 38 segments. Pubescence of mesoscutum thicker than in *gloriatorius* but less so than in *elator*. Mesoscutum with some vague, indistinct punctation. No trace of notaulices. Propodeum shorter than in *gloriatorius*, with denser pubescence, more even and somewhat characteristically directed backwards; lateral panels appearing duller because of fine punctation. Areolet of fore-wing markedly 4-sided, narrowed towards stigma. Front tibia with a single tooth on outer side; middle tibia with 3 teeth on outer side; hind claw much as in *elator*, less bent than in *gloriatorius*. Tergite 1 about 1·25 times longer than its apical width, with shining, indefinite sculpture much as in *gloriatorius*. Tergites 2+3 shining, with rather coarse, variable rugosity extending virtually to apex of segment; at base with weakly defined, transverse, subtriangular area. Ovipositor sheath 0·66 times as long as gaster, beset with bristly hairs, thicker than in *gloriatorius* and almost as thick as those of *elator*.

MATERIAL EXAMINED

Great Britain: 1 ♀ (lectotype), 'type', 'ex Polycommata', Dale coll. (UM); 1 ♂, 'type', Dale coll. (UM); 1 ♀, 'cotype', '1899' Dale coll. (UM); 1 ♂, 'cotype', Dale coll. (UM).

HOST. The label 'ex Polycommata' may refer to *Trichopteryx polycommata* (Denis & Schiffermüller) (Geometridae).

BAEOGNATHA Kokujev

Baeognatha Kokujev, 1903: 243. Type-species: *Baeognatha turanica* Kokujev, by monotypy.
Camptothlipsis Enderlein, 1920: 166. Type-species: *Camptothlipsis costalis* Enderlein, by original designation. [Synonymised by Tobias, 1976*a*: 214.]

DIAGNOSIS. Head in facial view like that of *Microdus*, transversely elliptical. Surface between antennal insertions slightly raised in the form of a weak hump or tubercle in longitudinal direction or simply rounded from back to front. Mouth parts not lengthened. Notaulices distinct throughout. Sternaulus very distinct. Outer side of middle tibia with at least 2 teeth remote from apical margin; inner spur of hind tibia not reaching middle of basal segment of hind tarsus; claws lobed. Areolet of fore-wing open (Fig. 60). Tergite 1 and basal half of tergites 2+3 with or without sculpture. Ovipositor at least as long as gaster.

The genus is typically *Microdus*-like in habitus but differs essentially in that the 2nd submarginal cell is not closed externally by a vein (*r–m*) so that an areolet is absent. *Microdus eriphyle* approaches *Baeognatha* in the kind of sculpture on the basal tergites of the gaster.

Key to species (females)

1 Ovipositor sheath about as long as gaster; basal segment of hind tarsus slightly shorter than following segments together; hind femur blackish .... ***nigra*** Telenga (p. 230)

– Ovipositor sheath about as long as body; basal segment of hind tarsus distinctly longer than following segments together; hind femur bright yellow .... ***armeniaca*** Telenga (p. 229)

Baeognatha armeniaca Telenga
(Fig. 60)

Baeognatha armeniaca Telenga, 1955: 300. Holotype ♀, U.S.S.R.: Armenia (AS) [not examined].

♀, 4 mm long (excluding ovipositor). Head mainly bright yellowish. Thorax variable in colour but with much pale marking; sometimes only mesoscutum and pronotum pale with rest of thorax infuscate. Gaster varying from entirely reddish yellow (except tergite 1) to almost black. Legs bright reddish yellow except for hind coxa which may show darkening at base. Wings virtually hyaline; medius colourless proximal to basalis.

Head in facial view transverse, only very weakly narrowed towards mouth. Face smooth, shining. Between antennal sockets a smooth, blunt keel. Preapical segment (3rd) of labial palpus very small, hardly longer than wide. Ocelli in rather low triangle with posterior tangent to anterior ocellus virtually touching posterior pair. Notaulices deeply impressed throughtout. Sternaulus deeply impressed, reaching posterior corner of mesopleurum. Propodeum coarsely rugose-reticulate with only the faintest indication of two broken, longitudinal keels. Distal abscissa of postmarginalis about 1·5 times longer than proximal abscissa (Fig. 60). Outer side of middle tibia with 1–2 teeth at middle and two close teeth at apex; inner spur of hind tibia not quite reaching middle of basal segment of hind tarsus; basal segment of hind tarsus distinctly longer than remaining segments together, 6 : 5; claws small, with large, basal lobe. Tergite 1 about twice as long as apically wide, with a dull, even sculpture of scaly-reticulation, the surface having almost a shagreened appearance with only a few weak, longitudinal ridges towards sides. Basal half of tergites 2+3 with a sculpture similar to that of tergite 1 but weaker and more vague; rest of gaster polished, shining. Ovipositor sheath about as long as body, less head.

MATERIAL EXAMINED

Austria: 1 ♀, Neusiedlersee, 20.viii.1960 (*G. J. Kerrich*) (BMNH). **Turkey**: 1 ♀, Ankara, Kavaklidere, 6.viii.1960 (*Guichard & Harvey*) (BMNH). **U.S.S.R.**: 3 ♀, ? Armenia, ex *Anarsia eleagnella* Kuznetzov (AS; one in BMNH).

HOSTS. *Anarsia eleagnella* Kuznetzov (Gelechiidae); *Cydia funebrana* Treitschke (Tortricidae); *Recurvaria nanella* (Denis & Schiffermüller) (Gelechiidae). These records from Tobias (1976: 214).

COMMENTS. This species is included on the strength of the single female recorded above from Austria. It differs from the more eastern specimens in being a little larger and much darker in colour, the head being mainly reddish yellow with darkened occiput and a dark patch in the middle of the face; the thorax and gaster above are entirely blackened and the hind coxa is pale only on the apical third; the relation between length of basal segment of hind tarsus and combined length of remaining segments has not been checked because the legs are broken.

The specific differences between *armeniaca* and *nigra* have been given in the key.

Baeognatha nigra Telenga

Baeognatha nigra Telenga, 1955: 300. Syntypes ♀, U.S.S.R. (AS) [not examined].

The interpretation of this species is based on a single female, identified by Tobias and borrowed from him.

♀, 3 mm long (excluding ovipositor). Black. Inner orbits brownish yellow, the yellow colour reaching antennal sockets. Hind femur infuscate; hind tibia infuscate on apical third, with faint, dark ring near base; hind coxa blackish.

Head in facial view slightly more narrowed below than in *armeniaca*. Face smooth, shining. Between antennal sockets a smooth, blunt ridge as in *armeniaca*. In dorsal view head slightly less transverse than in *armeniaca*. Antenna broken in both examples. Notaulices and sternaulus as in *armeniaca*. Radial cell slightly narrower than in *armeniaca*; distal abscissa of postmarginalis only slightly longer than proximal abscissa. Teeth of middle tibia and spur of hind tibia as in *armeniaca*; basal segment of hind tarsus slightly shorter than following segments together, 9:11. Gaster slightly less elongate than in *armeniaca* but sculpture of tergite 1 and basal half of tergites 2+3 similar, though that on tergites 2+3 is sharper and better defined than in *armeniaca* and the curved furrow is slightly deeper and more distinct. Ovipositor as long as gaster.

MATERIAL EXAMINED

U.S.S.R.: 1 ♀, Kazachstan, Urals, Ganvartsjevo (AS). **France**: 2 ♀, Mulhouse, Bois de Nonnenbruch, vi.1977, ex larvae of *Coleophora ?flavipennella* (Duponchel) on *Quercus* (*S. E. Whitbread*) (BMNH).

HOSTS. *Coleophora ?flavipennella* (Duponchel). The cocoon of the parasite is spun within the case of the host.

The distributional data on this species are scant but suggest that *Baeognatha nigra* is widespread.

Species inquirendae

Type-material of the following species is not available for examination.

Microdus abbreviator Ratzeburg, 1852: 45.
Microdus brevicaudis Reinhard, 1867: 356.
Microdus cingulator Ratzeburg, 1852: 46.
Agathis initiator Fonscolombe, 1846: 40.
Vipio insularis Snellen van Vollenhoven, 1873: 192.
Agathis major Fonscolombe, 1846: 39.
Ichneumon purgator Fabricius, 1793: 156.

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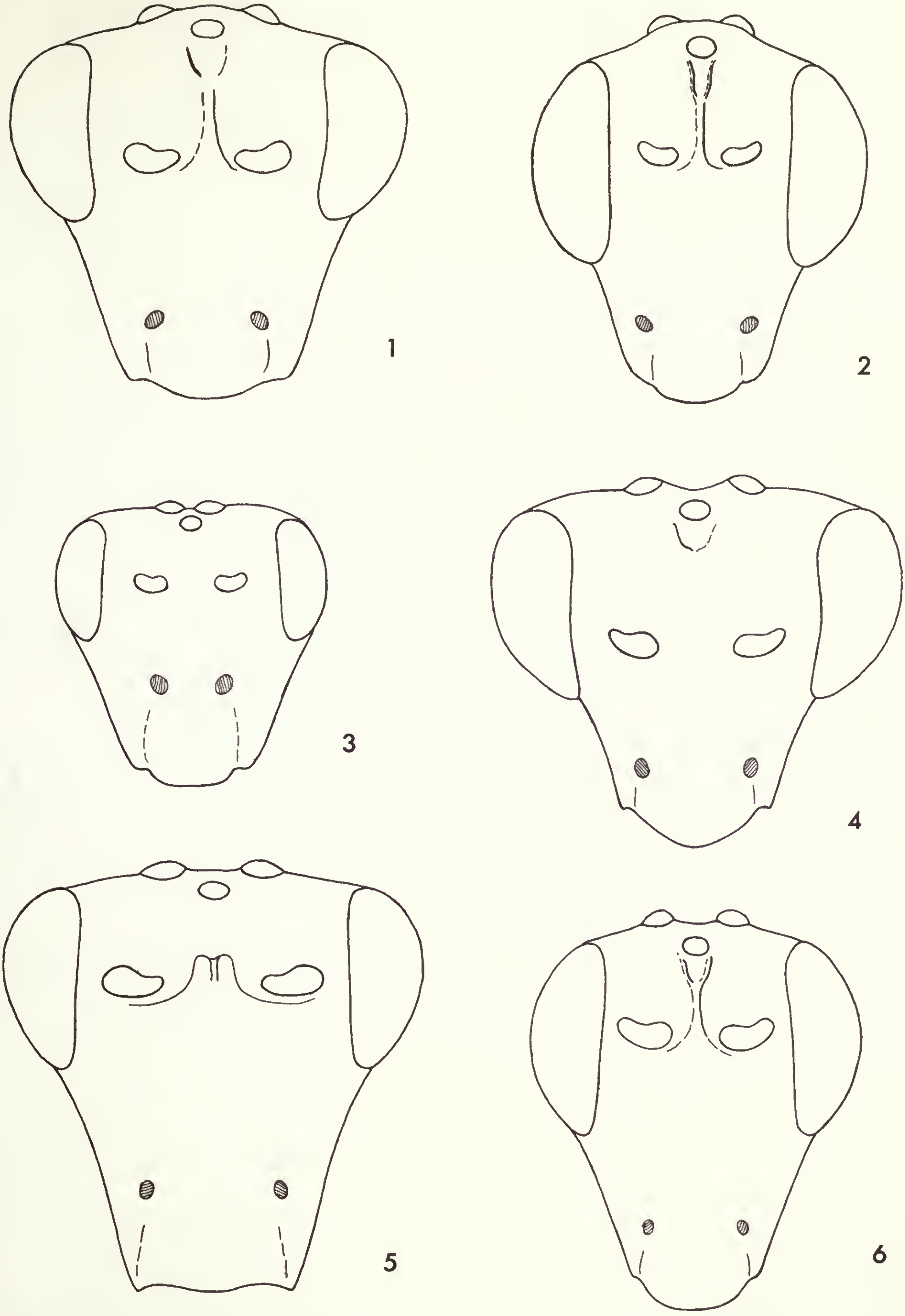
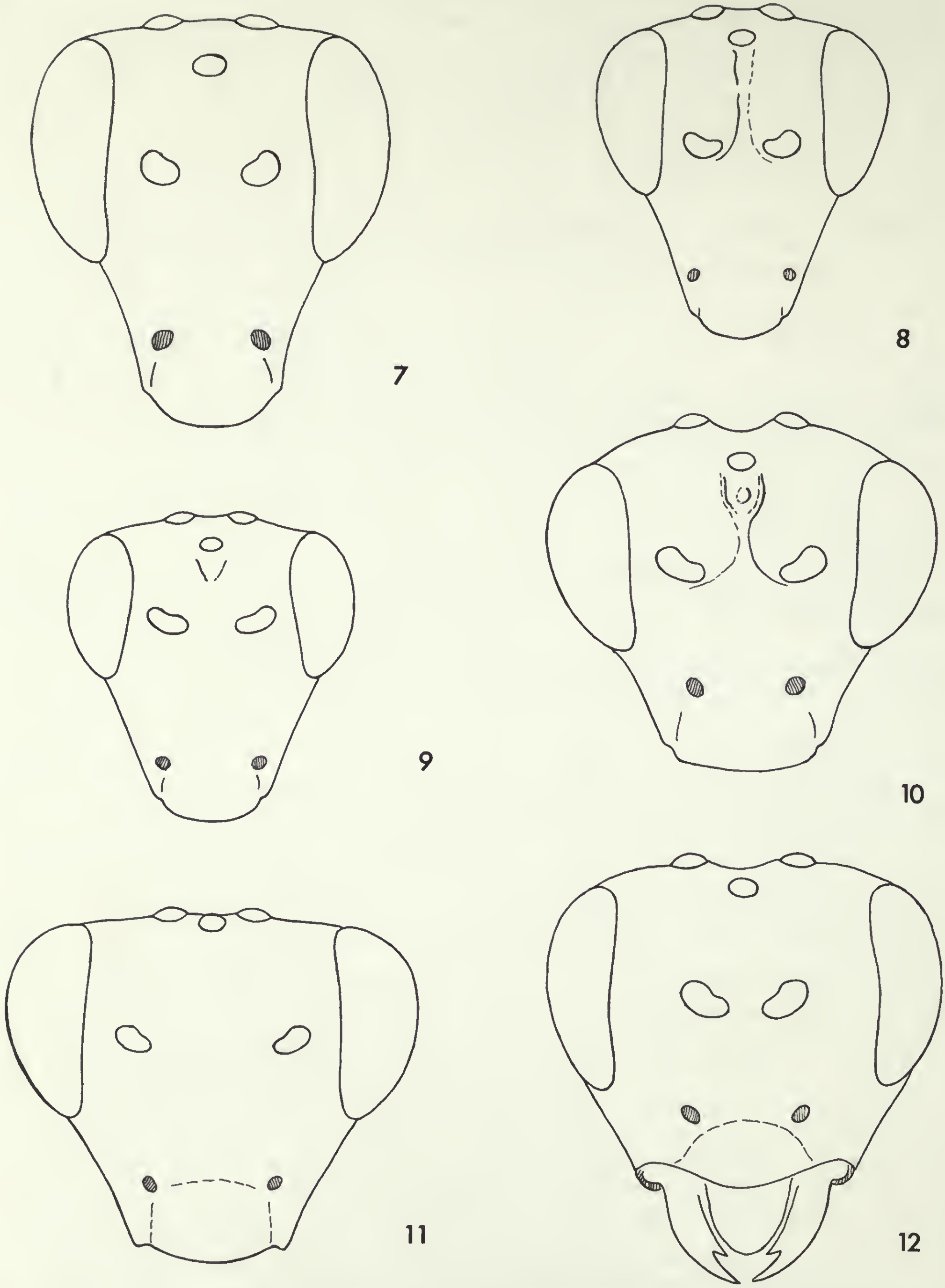
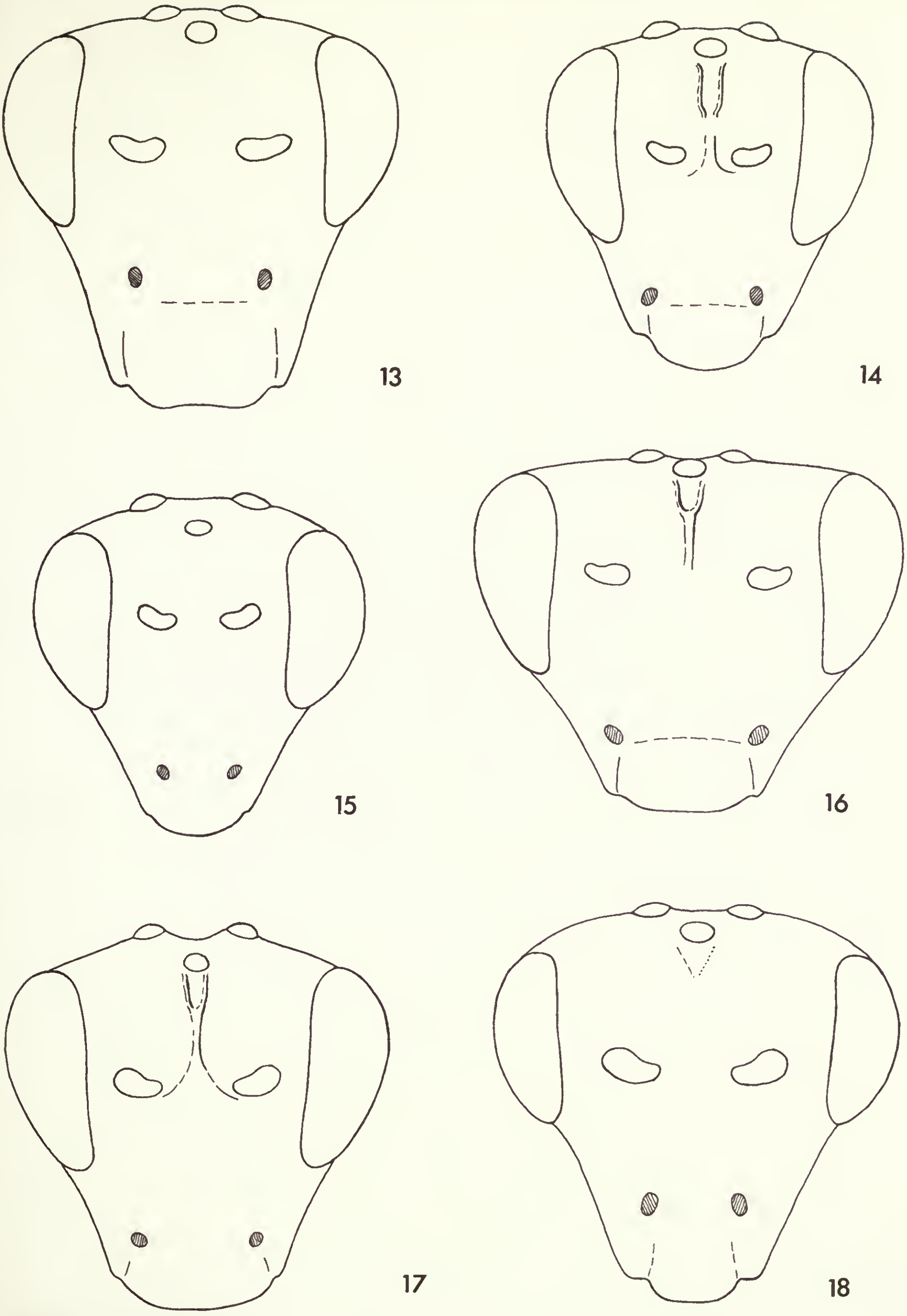


Figs 1–6 *Agathis* species, heads in facial view. 1, *ariadne* ♀; 2, *assimilis* ♀; 3, *glaucoptera* ♀; 4, *malvacearum* ♀; 5, *syngenesiae* ♀; 6, *anchisiades* ♀.



Figs 7–12 *Agathis* species, heads in facial view. 7, *zaykovi* ♀; 8, *polita* ♀; 9, *montana* ♀; 10, *fulmeki* ♀; 11, *nigra* ♀; 12, *pappei* ♀.



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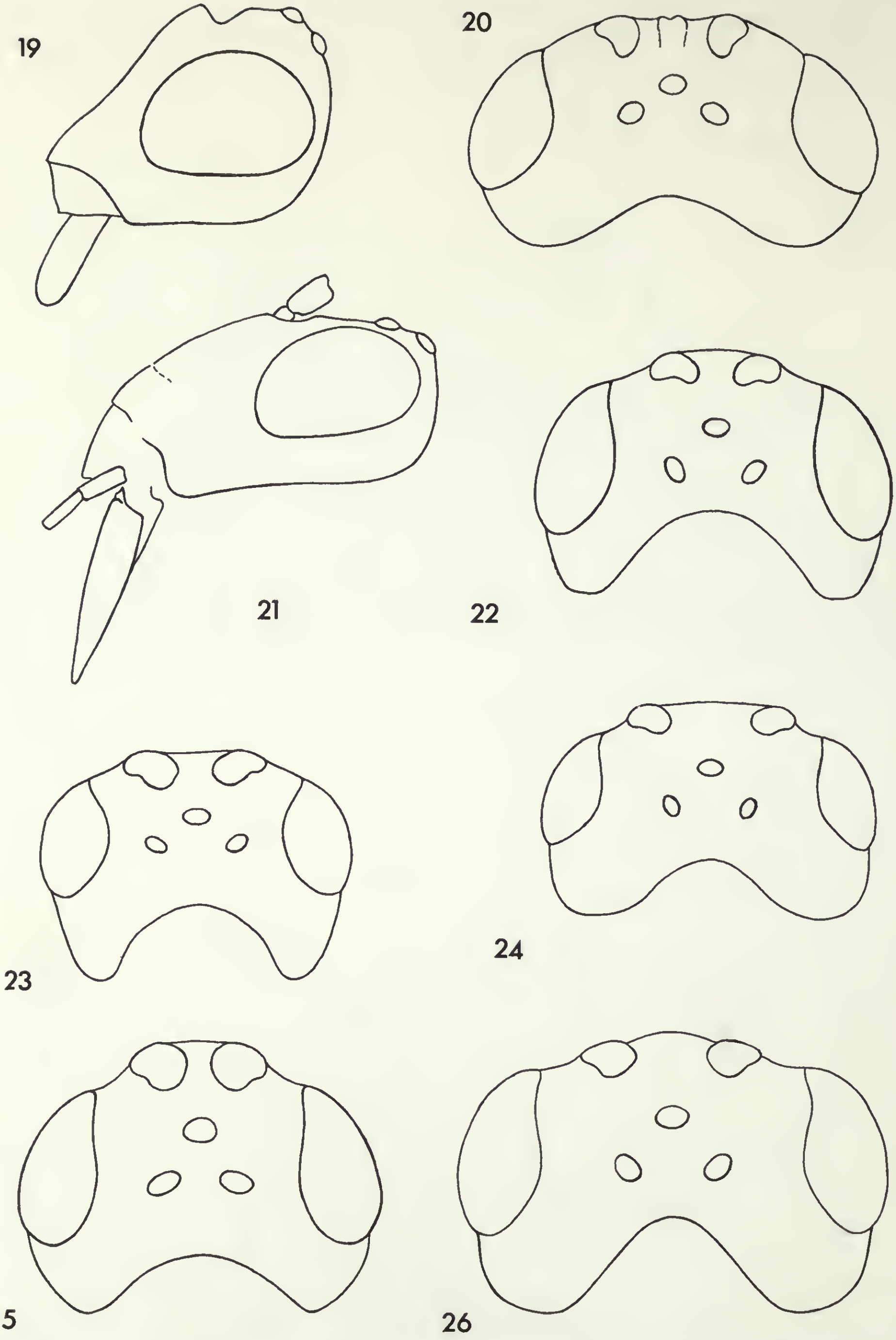

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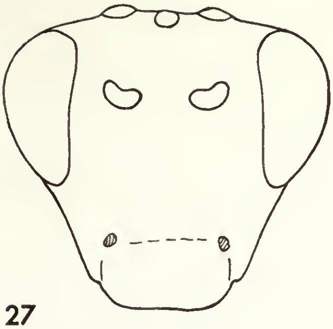

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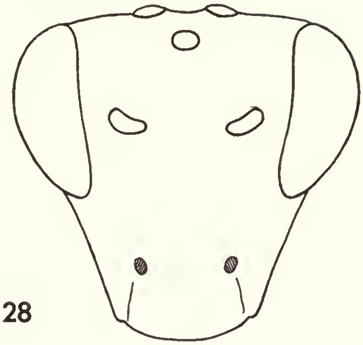

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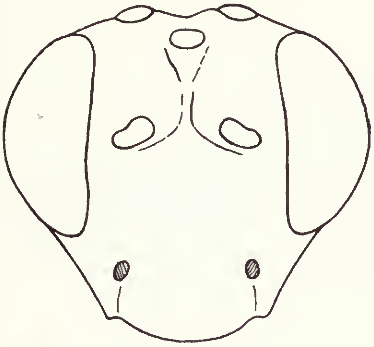

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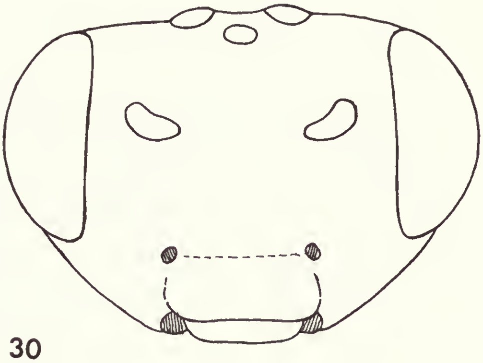

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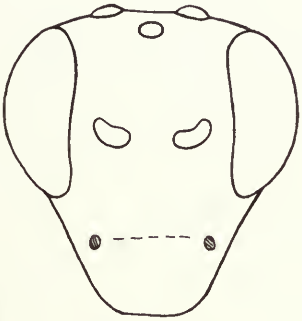

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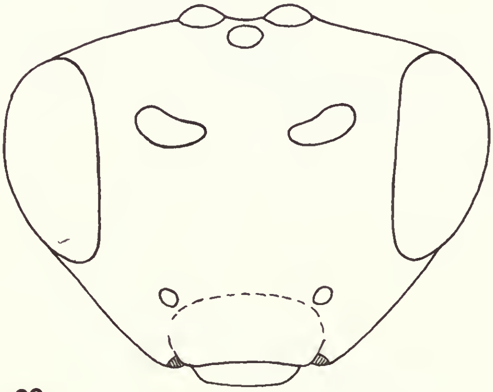

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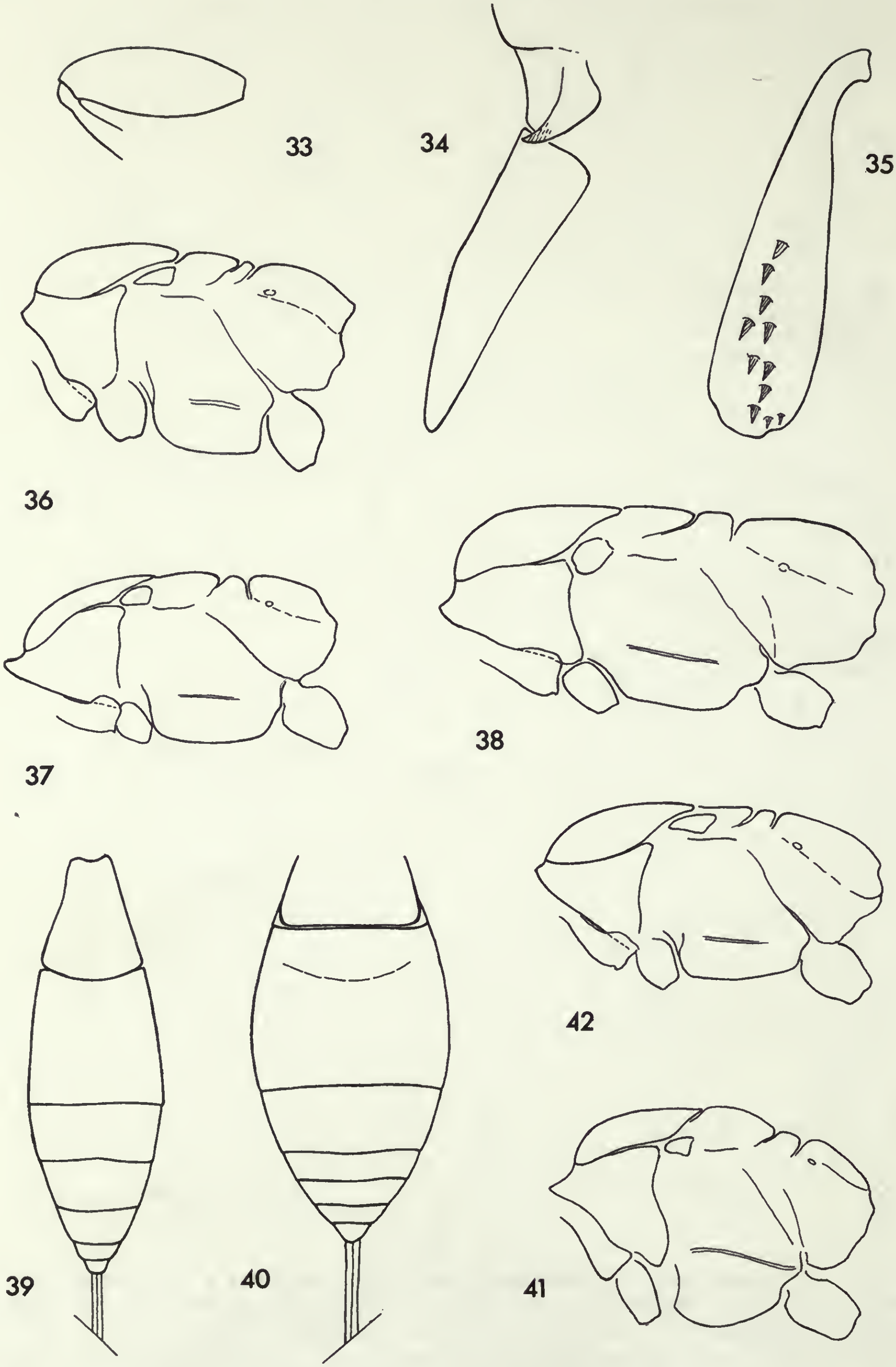
Figs 27–32 27–29, *Agathis* species, heads in facial view. (27) *meridionellae* ♀; (28) *glabricula* ♀; (29) *minuta* ♀. 30, *Microdus conspicuus* ♀, head, facial; 31, *Agathis asteris* ♀, head, facial; 32, *Microdus linguarius* ♀, head facial.



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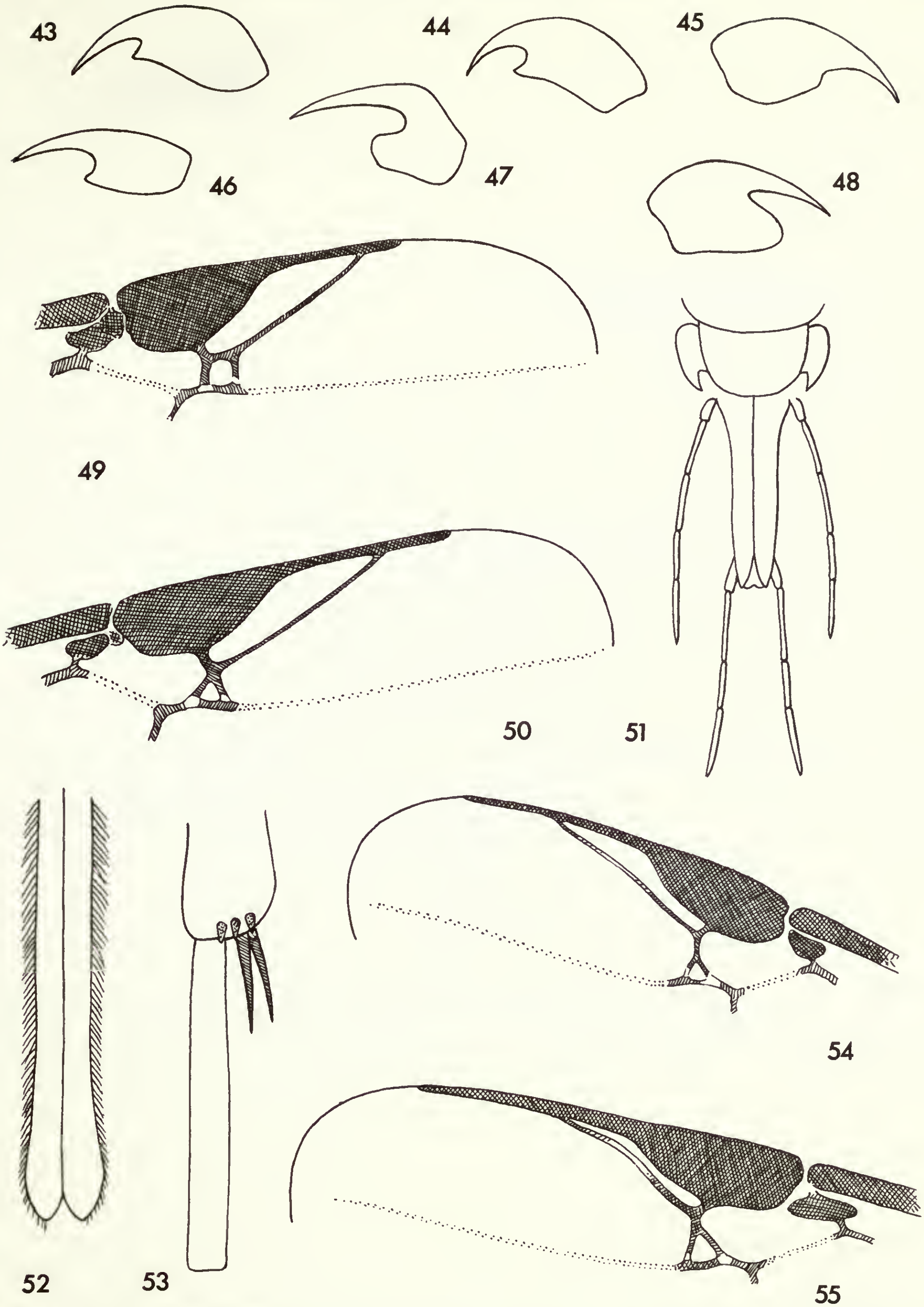

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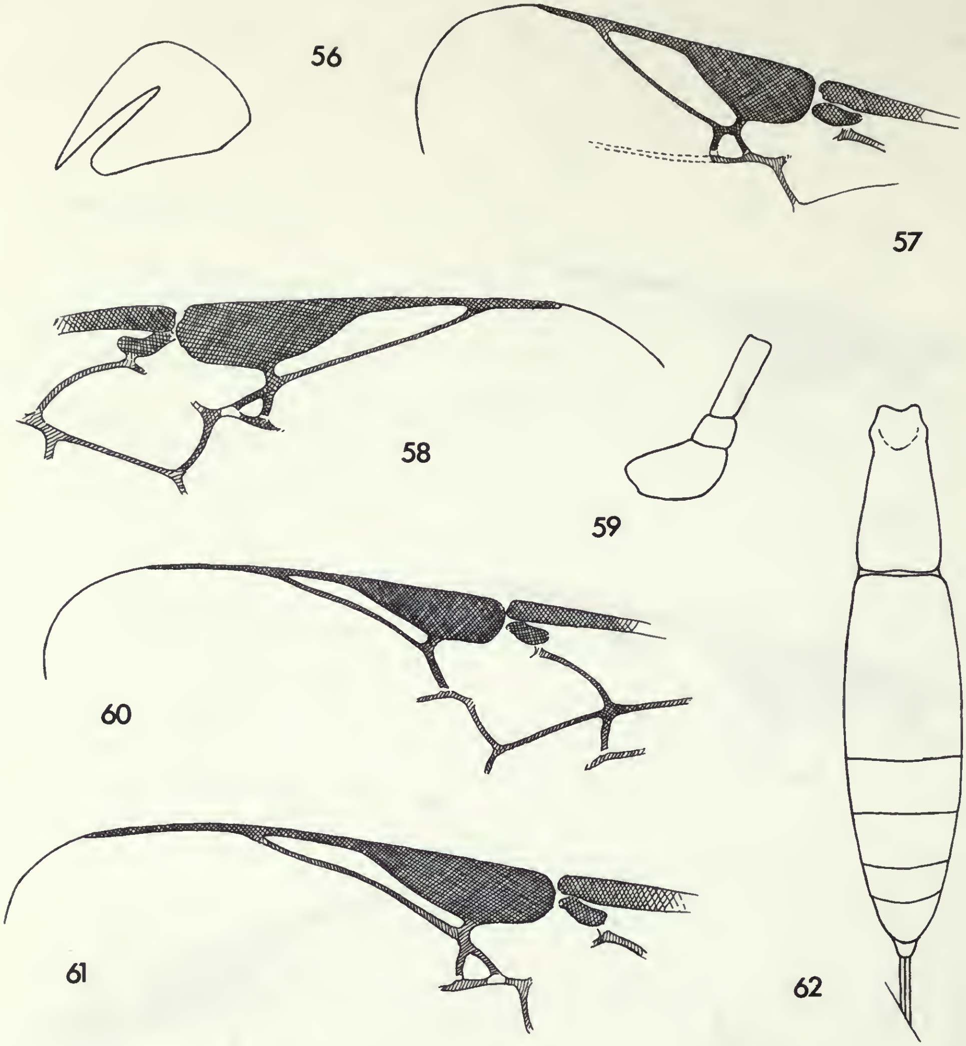
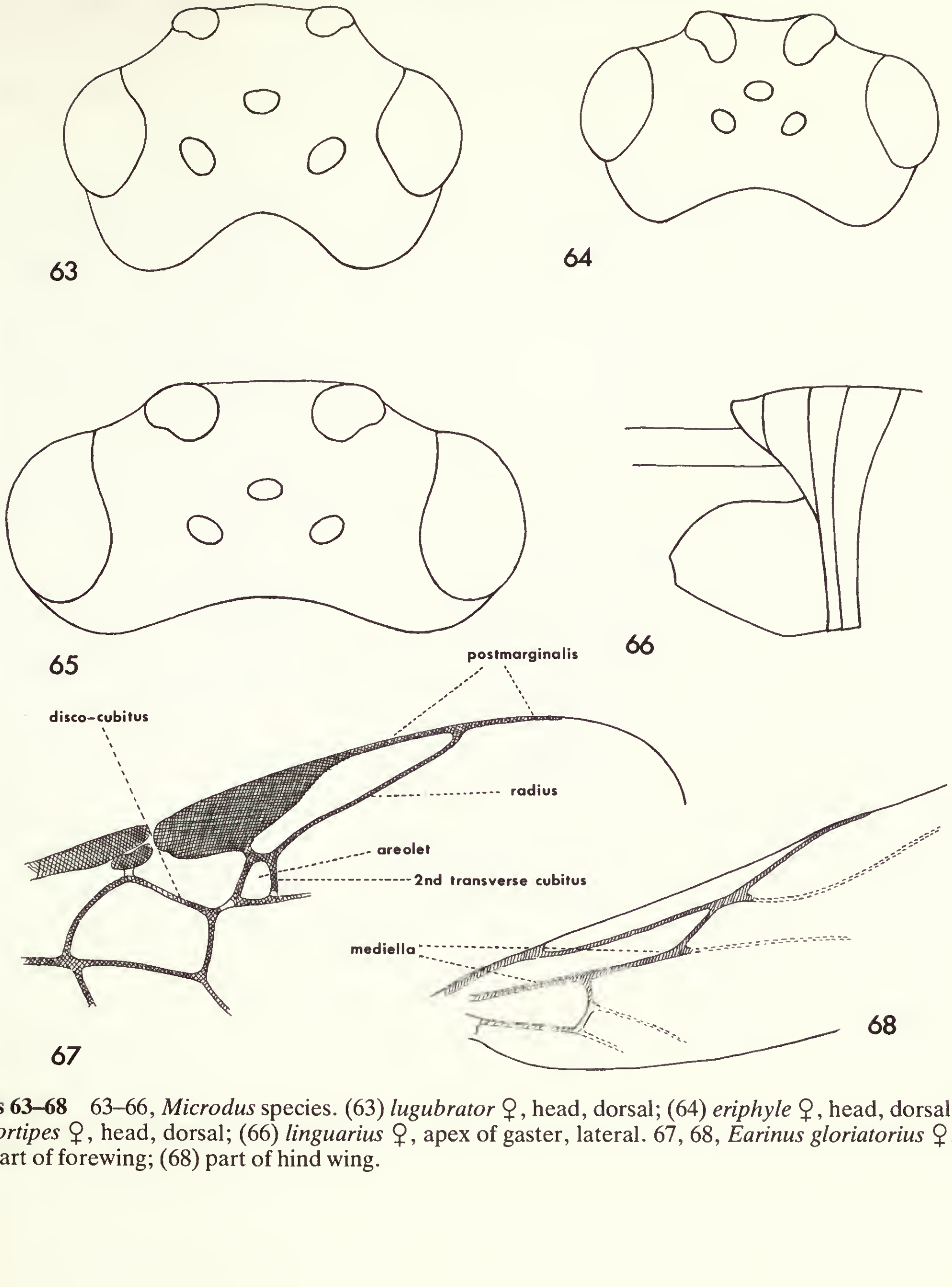


Figs 56–62 56–59 *Microdus* species. (56) *eriphyle* ♀, hind claw; (57) *lugubrator* ♀, part of forewing; (58) *tumidulus* ♀, part of forewing; (59) *lugubrator* ♀, base of antenna. 60, *Baeognatha armeniaca* ♀, part of forewing. 61, 62, *Microdus* species. (61) *conspicuus* ♀, part of forewing; (62) *eriphyle* ♀, gaster, dorsal.



Figs 63–68 63–66, *Microdus* species. (63) *lugubrator* ♀, head, dorsal; (64) *eriphyle* ♀, head, dorsal; (65) *fortipes* ♀, head, dorsal; (66) *linguarius* ♀, apex of gaster, lateral. 67, 68, *Earinus gloriatorius* ♀. (67) part of forewing; (68) part of hind wing.

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By J. Quinlan

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A key to the Afrotropical genera of Eucoilidae (Hymenoptera), with a revision of certain genera

J. Quinlan

Entomology series
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A key to the Afrotropical genera of Eucoilidae (Hymenoptera), with a revision of certain genera

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Synopsis

A key to the 19 genera of Afrotropical Eucoilidae is provided, together with keys to the species of ten genera. Two genera (*Ealata, Nordlanderia*) and 98 species are newly described; the primary types of eight nominal species have been examined, of which two are newly synonymized. A checklist of the ten genera and 111 species dealt with is included.

Introduction

The virtually cosmopolitan family Eucoilidae is one of the largest and most distinctive groups of Cynipoidea. These small, mostly blackish insects are easily recognizable by the presence of a highly modified scutellum (Fig. 2). They occur wherever their dipteran hosts are found. As far as is known (and the biology of many species has never been investigated) eucoilids are protelean endoparasites of the larvae and puparia of cyclorrhaphous Diptera. A number of species attack various phytophagous Diptera in the families Agromyzidae, Anthomyiidae, Chloropidae, Drosophilidae and Tephritidae (Thompson, 1955), families that include a variety of serious agricultural pests. Consequently several eucoilids are of considerable economic importance as potential biological control agents. A number of species in the genera *Hexacola, Trybliographa, Rhoptromeris, Kleidotoma* and *Ganaspidium* are of interest since they parasitize species of

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Liriomyza, Oscinella and *Hylemyia* which attack cereal and related crops. *Trybliographa daci* Weld is parasitic on the oriental fruit-fly (*Dacus dorsalis* Hendel) which is a well-known pest of a variety of fruit and vegetable crops. Probably the most extensively studied eucoilid is *Trybliographa rapae*, a common parasite of *Hylemyia* species which attack brassicas (Wishart & Monteith, 1954). In Europe *Rhoptromeris heptoma* (Hartig) is an important parasite of the frit fly (*Oscinella frit* (L.)) (Nordlander, 1978*b*).

A variety of other species of Eucoilidae attack dipterous larvae inhabiting dung and carcasses, including species of the families Calliphoridae, Muscidae, Sepsidae and Sphaeroceridae (Thompson, 1955). For example, the European eucoilid *Kleidotoma marshalli* Cameron is known to parasitize larvae of a variety of *Calliphora, Lucilia* and *Musca* species, whilst *Eutrias tritoma* (Thomson) has been reared in the U.S.A. from sepsid puparia in cow dung (Weld, 1952).

Various authors have published papers on the Afrotropical Eucoilidae: Benoit (1956), Bridwell (1919), Cameron (1904), Hedicke (1928*a*, 1928*b*), Kieffer (1919, 1913), Masner (1960) and Risbec (1950, 1956). Some have described new genera and species, others only species. Apart from Kieffer (1910) and Weld (1952), who give keys to genera on a world basis, no one has attempted to key genera and species of the Afrotropical Eucoilidae. During the preparation of this paper all available type-material has been examined and redescribed. When type-material of a taxon was not available its presumed taxonomic position is discussed in the text. A key to the genera of Afrotropical Eucoilidae is given and ten of these genera are revised with keys to species; two genera and 98 species are described as new. One genus, *Stentorceps*, is included in a generic key for the first time. A further nine genera remain to be revised.

Material examined and terminology

I have been fortunate to have on loan large amounts of material from Dr J. Decelle, Musée Royal de l'Afrique Centrale, Tervuren. This material, together with R. E. Turner's collection and other more recently obtained specimens (principally from Malaise traps) in the British Museum (Natural History), has formed the basis for this revision. Very large areas of the Afrotropical region remain from which material has not been available for examination. In very few instances are host data given and then only from the labels attached to the specimens. The terminology follows Richards (1977) but some older names are used, particularly in reference to wing venation. I have, where pertinent, related older terminology to the more recently introduced terminology of Nordlander (1982*b*). The term Afrotropical Region used in this paper was coined by Crosskey & White (1977) but was not employed in my earlier paper of 1979. Figures 1 and 2 have their respective parts labelled in abbreviated form, as follows:

anterior parallel lines – apl; hairy ring – hr; hypopygium – hy; lateral bar – lb; lateral lines – ll; lateral ridges – lr; mesoscutum – m; mesopleurae – mp; mesopleural suture – mps; malar ridge – mr; metapleurae – mt; notaulices – nt; nucha – nu; propodeum – pd; pronotal plate – pp; pronotum – pr; scutellum – sc; scutellar cup – scc; scutellar disc – scd; scutellar foveae – sf; tegulae – tg.

The following terms are used for the lines or furrows on the mesoscutum, anterior parallel lines, notaulices and lateral lines. Nordlander (1982) used the terms antero-admedian lines, notaulices and parapsidial furrows respectively.

Depositories

Type depositories are abbreviated in the text as follows.

BMNH	British Museum (Natural History), London.
GERDAT	Groupement D'Ètudes et de Recherches pour le developpment de L'Agronomie Tropicale, Montpellier.
MNHN	Muséum National d'Histoire Naturelle, Paris.
MRAC	Musée Royale de l'Afrique Centrale, Tervuren.
NCISA	National Collection of Insects, Division of Entomology, Pretoria.

USNM	United States National Museum of Natural History, Washington, D.C.
ZMC	Zoologisk Museum, Copenhagen.
ZSBS	Zoologische Sammlung des Bayerischen Staates, Munich.

Affinities of Eucoilidae with other Cynipoidea

Amongst the Cynipoidea many of the higher taxa are definable in terms of biological as well as structural differences. Known biologies may be summarized thus:

FAMILY-GROUP TAXON	HOST
Ibaliidae	Siricoidea (Chrystal, 1930; Spradberry, 1970)
Liopteridae	
Oberthuerellinae	Unknown
Liopterinae	Unknown
Mesocynipinae	? Cerambycidae (Diaz, 1973)
Eucoilidae	Cyclorrhaphous Diptera
Figitidae	
Figitinae	Cyclorrhaphous Diptera (Askew, 1971)
Aspicerinae	Syrphidae (Weld, 1952)
Anacharitinae	Hemerobioidea (Selhime & Kanavel, 1968)
Himalocynipinae	Unknown
Cynipidae	
Cynipinae	Phytophagous gall-causers and gall inquilines (Eady & Quinlan, 1963)
Austrocynipinae	Reared from seeds of *Araucaria* (Araucariaceae) (Riek, 1971)
Charipidae	
Alloxystinae	Aphidiinae and Aphelinidae (as hyperparasites through Homoptera) (Quinlan & Evenhuis, 1980)
Charipinae	Psylloidea (Kierych, 1979)

The Eucoilidae is distinguished from the five other families of Cynipoidea by the highly modified scutellum. This comprises an outer disc surmounted by a cup- or tear-drop-shaped elevation in the centre with a foveolate depression posteriorly. The family is apparently most closely related to the Figitidae which, except for the form of the scutellum, they resemble in structure. The two families have rather similar life-histories, in that most species are endoparasites of larvae and puparia of cyclorrhaphous Diptera, although the morphologically distinctive Anacharitinae parasitize hemerobioid lacewing larvae (Selhime & Kanavel, 1968; Lipkow, 1969). The Eucoilidae and Figitidae, together with the Cynipidae and Charipidae, have segments 2 and/or 3 of the gaster enlarged, whilst the more posterior segments (4+) are the largest in other cynipoids (Quinlan, 1979). Tergite 1 is variable in shape from a long petiolate structure to an almost obscured crescent-shape, wider than long. The elongate petiolate form does not occur in the Cynipidae or Charipidae, but is found in the Eucoilidae and Figitidae. Males of most families have much less specialized gasters. Whilst the Eucoilidae are easily separated from other families by the form of the scutellum, some eucoilid genera do show apomorphic features exhibited by genera in other families. For example, a strongly indicated ring of hairs is present at the base of tergite 2 in many eucoilid genera (e.g., *Trybliographa, Rhoptromeris* and *Kleidotoma*), whilst a less conspicuous ring of hairs is found in certain genera of Cynipidae (e.g., *Aulacidea* and the related genera *Aylax* and *Isocolus*). A sparser ring of pubescence is also found in some Charipidae.

The plant-feeding habits of the Cynipidae are in contrast to the endoparasitic entomophagy of the Eucoilidae and Figitidae. At first sight, therefore, the shared characteristics of the gaster of these taxa would appear to be the result of convergence, though it is possible that the Cynipidae adapted to their herbivorous mode of life from a figitid ancestor consuming the larvae of leaf- or stem-mining Diptera.

Taxonomic characters

Head

The female antenna is 13-segmented (occasionally 11, 12 or 14) and the overall shape is of importance, both at generic and specific level, but must be used in combination with other characters. Some species have filiform antenna, others are distinctly clavate. In those species with filiform antenna the term 'club' refers specifically to those apical segments of the antenna that bear rhinaria (Figs 229, 230), even though they may not appear swollen. In those species with clavate antenna the club is very clearly swollen as well as each segment having rhinaria (Figs 237, 256). The male antenna is 15-segmented, filiform and in some species the third or fourth segment is modified. This is of major importance at generic and specific level. The characters of the head have not been used to any great extent at the generic level although the sculpture of the occiput and the presence of striations around the malar area, the size and shape of the compound eye (the distance between them in relation to the height of an eye), the variation in the shape of the vertex viewed posteriorly, and the occipital carina are important, particularly at species level.

Thorax

The thorax (including the first abdominal segment of the propodeum, *vide* Richards, 1977) has many important characters. As mentioned above, the pronotal plate is extremely diverse in shape and form. The mesoscutum is invariably polished; notaulices, anterior parallel lines and lateral lines are either present, partially present or completely absent. Sometimes a line of hairs is present and replaces the notaulices. These structures are referred to under different names by Nordlander (1982*b*). The mesopleuron exhibits a wide variety of shapes and in the majority of genera the mesopleural carina or suture is present, either partly or completely. This structure has also been referred to as the mesopleural furrow (Eady & Quinlan, 1963). In some genera the subalar pit is very distinct whilst it is absent in others. The metapleuron varies in the number of transverse ridges present and in some species an anteroventral cavity is present, either with or without setae. The scutellum viewed dorsally comprises a central plate and an outer margin, 'cup' and 'disc' of earlier authors, termed scutellar plate and dorsal surface of the scutellum respectively by Nordlander (1982*b*). As indicated earlier, the cup varies in size and shape and in the number of foveae (if any) present around the outer margins. In most genera a single large fovea is present medially on the apical half of the cup. The scutellar disc is variable in both dorsal and, in some genera, lateral views, its surface is sometimes smooth and polished or in others a variety of sculpture is present. The shape of the scutellar disc at the apex is either rounded, conical or spine-shaped; in a few genera the apex is bicuspid. Many earlier authors have placed those species with a conical or spine-shaped scutellar disc in the same genera without regard to more fundamental characters. The propodeum in dorsal view invariably has carinae varying in shape and alignment to each other, with varying densities of sculpture medially, and pubescence on either side of the carinae. The nucha at the posterior end of the propodeum is obscure but generally ridged.

Gaster

The gaster comprises eight segments and has spiracles on segments 1 and 8 (Richards, 1977). The number of segments visible in lateral view varies from genus to genus. Segment 1 of the gaster is short, about as broad as long, normally smooth or crenulate, except for a few Neotropical genera in which it is long and narrow, in some cases longer than the combined lengths of the remaining segments. The second segment is always the largest, generally as large as the remaining visible segments combined. In some genera the base of the second tergite has a ring of pubescence obscuring the first tergite, either in lateral view or completely on the dorsal surface as well. The overall shape of the gaster is variable within genera and it is laterally compressed to a lesser or greater extent. The hypopygium of the female is moderately to strongly projecting. The legs vary little within the Eucoilidae except that the size ratio of coxae, femora, tibiae and tarsi varies from species to species. In some genera the presence of hair patches on the mid-coxae has proved to be of value at species level (Nordlander, 1982*a*).

Wings

The venation of the forewing of Cynipoidea has been used extensively at family, generic and specific level. Earlier authors gave much emphasis, particularly with eucoilids, to the radial cell, placing great reliance on whether it was closed or open on the wing margin. In many instances it is hard to decide one way or the other, the venation being vestigial (Day, 1984), having linear convexity in dorsal view, being concave ventrally, thus showing no clear or distinct longitudinal boundary when viewed with transmitted light, being only pigmented and not sclerotised.

Size

The overall size of Eucoilidae varies from genus to genus, ranging from 1·5–5·0 mm.

The generic classification of Eucoilidae and discussion of relationships

Earlier authors (Dalla Torre & Kieffer, 1910; Weld, 1952) tried to delimit genera on superficial characters, such as the radial cell being either open or closed, the presence or absence of a ring of hairs at the base of tergite two of the gaster, the scutellum either with or without a spine on the apical margin or the apex rounded, truncate, conical or emarginate. This resulted in an assemblage of genera containing species not necessarily related to each other.

Nordlander (1982*b*) in his phylogenetic classification of the Eucoilidae, recognised 28 valid genera which he divided into the following monophyletic groups.

1. *Gronotoma*-group comprising *Zaeucoila, Gronotoma, Diglyphosema, Disorygma, Microstilba.*
2. *Trybliographa*-group comprising *Trybliographa, Eucoila, Bothrochacis.*
3. *Rhoptromeris*-group comprising *Leptopilina, Cothonaspis, Rhoptromeris, Trichoplasta.*
4. *Chrestosema*-group comprising *Chrestosema, Glauraspidia, Pseudopsichacra, Odonteucoila, Dieucoila, Leptolamina.*
5. *Ganaspis*-group comprising *Ganaspis, Tetramerocera, Paramiomoea, Pentamerocera, Coneucoela, Didyctium, Hexacola, Hypodiranchis.*
6. *Kleidotoma*-group comprising *Eutrias, Kleidotoma.*

At present I recognise 19 of these genera as occurring in the Afrotropical region. It is impossible to elucidate Nordlander's generic parameters from his five papers sufficiently well to recognise generic relationships precisely. Quinlan (1978) established the significance of the pronotal plate at species level. In the present work further emphasis is placed on this feature at generic level, particularly as to whether or not the pronotal plate projects forward when viewed dorsally and laterally, and to the presence of either enclosed or open lateral foveae either side of the medial area of the plate. The present key to genera attempts to indicate the phylogenetic relationships. The genera *Nordlanderia, Disorygma, Diglyphosema, Ealata* and *Eucoilidea* all have a plesiomorphic form of pronotal plate, i.e. it does not project forward, being similar in many respects to that found in the Figitinae and the cynipine genera *Aulacidea* and *Aylax*. Coupled with this form of pronotal plate, the base of tergite two of the gaster never has a ring of dense pubescence, at the most only a few sparse hairs on the lateral margins. The remaining genera, the majority, form a monophyletic group characterized by the apomorphic form of pronotal plate. In these genera the plate projects forward and is visible in dorsal and lateral view. Within this group, the genera *Trichoplasta, Rhoptromeris* and *Stentorceps* have the plate further modified, in that there is lateral fusion of the anterior and posterior parts so that the fovea either side of the pronotal plate are closed on the lateral margins (Figs 246, 351). Nordlander (1982*a*) was the first to draw attention to this shared character of *Trichoplasta* and *Rhoptromeris*. In some species of this group the medial bridge between the foveae is obscure or in the form of a transverse groove (Fig. 250). *Stentorceps* differs remarkably from *Trichoplasta* and *Rhoptromeris* in having extraordinary protuberances on the head, a trumpet-shaped protrusion on the supraclypeal area of the face (Figs 31, 32) and elongate mandibles (Fig. 290). *Trichoplasta* is primarily separated from *Rhoptromeris* and *Stentorceps* by the elongated, almost spine-shaped apex of the scutellum. *Rhoptromeris* is further distinguished from *Trichoplasta* by the forewing venation. All other genera with a projecting pronotal plate have the foveae either side of the medial area of the pronotal plate open and form separate groups of genera. Nordlander (1982*a*) published a cladistic analysis of *Trybliographa, Leptopilina, Cothonaspis, Rhoptromeris* and *Trichoplasta* using a matrix of 16 characters; the characters were divided into plesiomorphic (primitive) and apomorphic (derived) states and the character polarity determined through outgroup comparisons using the operational rule of Watrous & Wheeler (1981). Nordlander concluded that *Leptopilina, Cothonaspis, Rhoptromeris* and *Trichoplasta* had seven synapomorphies in common and constitute a monophyletic group. I believe that the form of the pronotal plate clearly separates *Rhoptromeris* and *Trichoplasta* from *Leptopilina* and *Cothonaspis*. Masner (1958), in discussing the genus *Ganaspis*, relates it to *Leptopilina, Rhoptromeris, Pseudeucoila* (now a synonym of *Trybliographa*) and *Odonteucoila*. Masner (1960) included in his key to *Odonteucoila* three species now recognised as *Trichoplasta* from the Afrotropical Region, the significance of the pronotal plate not being noted. I have included both *Odonteucoila* and *Coneucoela* in the generic key although both genera appear to be restricted to the Neotropical Region; species originally described in both genera from the Afrotropical Region have recently been transferred to *Trichoplasta* (Nordlander, 1982*a*). Weld (1952), as did Masner, characterised *Ganaspis* by the flat, mirror-like, elliptical scutellar cup. Quinlan (1978) erroneously based his interpretation of the genus on one of the species included in Masner's key, the holotype of the type-species, *Ganaspis mundata* Foerster not being available. Nordlander (1980), however, placed *G. subnuda* with *Leptopilina heterotoma* (Thomson) as a junior synonym. A female of the type-species was redescribed by Weld (1952). *Ganaspis* is a complex genus and needs more research at species level before deciding its relationship to other genera. At present it is defined by the mirror-like, almost flat scutellar cup and the weakly conical apex of the scutellum. *Leptopilina* shares a number of characters with *Cothonaspis, Rhoptromeris* and *Trichoplasta*, and this is illustrated in Nordlander's cladogram referred to above. Prior to Nordlander (1980), *Leptopilina* had hardly been referred to in the literature. Weld (1952) had doubts about the placement of *Leptopilina*, the holotype of the type-species being a male, and suggested that it could be a *Ganaspis* species. However, *Leptopilina*, although dissimilar, appears to be closest to *Cothonaspis* in the shape of the thorax and in the petiole (first segment of the gaster) which is widened posteriorly although it has a denser ring of hairs (sometimes thin) at the base of tergite two. *Cothonaspis* (one of the earliest described genera in the Eucoilidae) has many characters in common with *Rhoptromeris* and *Trichoplasta*. It differs (apart from the pronotal plate character referred to above) primarily by the form of the first segment of the gaster, which is virtually hairless and carinate, and the base of tergite two which has only very sparse pubescence on the lower lateral margins. *Hexacola* and *Kleidotoma* have a number of characters in common, such as, for example, the shape and sculpture of the scutellum. In both genera the cup is small and the scutellar disc is either longitudinally striate or reticulate-striate, but exceptionally it can be almost smooth. They differ mainly in the wing characters. In *Kleidotoma* the apex of the wing is either incised or arcuate, and the radial cell of the forewing is open on the margin and distinctively shaped (Fig. 8). In *Hexacola* the apex of the wing is rounded and the radial cell is decidedly closed on the margin (Fig. 164). Nordlander (1982*b*) regards *Hexacola* as being in the *Ganaspis* group of genera (p. 247). *Afrodontaspis* has a number of unique characters that do not indicate a clear relationship with any other group of genera, i.e., the scutellar cup is declined posteriorly so that it is not completely visible in dorsal view (Fig. 50). The sides of the pronotum, mesoscutum, lateral bars of the scutellum and scutellar disc are striate (Fig. 50). The scutellum is sharply pointed apically and the wing surfaces are dotted with hair bases similar to those found in *Bothrochacis* and *Eucoila*. In Weld's key (1952) it would run close to *Trissodontaspis*, a Neotropical genus. It is distinguished from it, however, by the radial cell of the forewing being open and by the structure of the scutellum. *Eucoila* and *Bothrochacis* both have almost bare wing surfaces (only a few hairs are present) and are separated from each other by the striking apomorphic cup of *Bothrochacis* in which the scutellar cup itself is sharply declined apically. The surface of the cup is elevated in front of the posterior fovea so that, when viewed dorsally, it appears declined apically. *Trybliographa* has world-wide distribution and is extremely rich in numbers of species; they are slightly larger in size than those of other genera except *Bothrochacis* and *Eucoila*. Nordlander (1981) synonomized eight Foerster genera, previously regarded as distinct, with *Trybliographa*. No keys are given to genera but from his remarks on the generic relationships, *Bothrochacis* and *Eucoila* are related by a series of characters regarded as symplesiomorphic. In common with *Eucoila* and *Bothrochacis*, the scutellar plate is large, almost circular in some species and well elevated, depressed in the centre with a large apical fovea. The scutellar disc varies in degree and intensity of sculpture, from punctate-reticulate-rugose. In a large number of species the lateral bars of the scutellum are striate in part. The ring of pubescence at the base of tergite two of the gaster is dense and complete on the dorsal surface. The radial cell of the forewing can be open or closed. Nordlander (1982*a*) places *Glauraspidia* in the *Chrestosema*-group. *Glauraspidia* itself is characterized and distinguished from related genera by the absence of a mesopleural suture, although in some species it may be weakly indicated. The dense pubescence either side of the pronotal plate and on the entire metapleuron, and the density of the pubescence on the propodeum together with a dense felt-like ring of pubescence at the base of tergite two of the gaster further distinguish this genus. Benoit (1956) described a monotypic genus *Daruna*, relating it to *Rhoptromeris* but distinguishing it by the rather unusual form of the scutellar cup which has two large foveae, one centrally and almost round, the other on the apex and transverse. The surface of the scutellar disc is smooth and shining, the apex rounded. The pronotal plate projects forward and the foveae are open on the lateral margins. The systematic position of *Daruna* is unclear, but the form of the pronotal plate suggests that it is not closely related to *Rhoptromeris*.

Checklist of the Afrotropical Eucoilidae included in this paper

EUCOILIDAE Thomson, 1862
- ***AFRODONTASPIS*** Weld, 1961
  - ***lanatus*** **sp. n.**
  - ***striatissima*** Benoit, 1956
- ***COTHONASPIS*** Hartig, 1840
  - ***dulcis*** **sp. n.**
  - ***ealis*** **sp. n.**
  - ***pentatoma*** Hartig, 1840
- ***EALATA*** **gen. n.**
  - ***clava*** **sp. n.**
  - ***marica*** **sp. n.**
  - ***saba*** **sp. n.**
- ***EUCOILIDEA*** Ashmead, 1887
  - *Afrostilba* Benoit, 1956 **syn. n.**
  - ***advena*** **sp. n.**
  - ***bucca*** **sp. n.**
  - ***compressa*** **sp. n.**
  - ***conversa*** **sp. n.**
  - ***dubia*** **sp. n.**
  - ***extraria*** **sp. n.**
  - ***fetura*** **sp. n.**
  - ***furcula*** **sp. n.**
  - ***lacerta*** **sp. n.**
  - ***lana*** **sp. n.**
  - ***leptis*** **sp. n.**
  - ***marcellus*** **sp. n.**
  - ***mauri*** **sp. n.**
  - ***nitida*** (Benoit, 1956) **comb. n.**
  - ***pallida*** **sp. n.**
  - ***perangusta*** **sp. n.**
  - ***trulla*** **sp. n.**
  - ***tyrus*** **sp. n.**
  - ***urundiensis*** Benoit, 1956
- ***HEXACOLA*** Foerster, 1869
  - ***absensa*** **sp. n.**
  - ***amantia*** **sp. n.**
  - ***atropos*** **sp. n.**
  - ***bifaria*** **sp. n.**
  - ***compacta*** **sp. n.**
  - ***fringa*** **sp. n.**
  - ***hexatoma*** (Hartig, 1841)
  - ***octoclava*** **sp. n.**
  - ***pallida*** **sp. n.**
  - ***quinqueclavata*** **sp. n.**
  - ***quisnama*** **sp. n.**
  - ***septemius*** **sp. n.**
  - ***zama*** **sp. n.**
- ***KLEIDOTOMA*** Westwood, 1833
  - ***arbitra*** **sp. n.**
  - ***bifurcata*** **sp. n.**
  - ***conica*** **sp. n.**
  - ***distenda*** **sp. n.**
  - ***eala*** **sp. n.**
  - ***elongula*** **sp. n.**

  - ***erebus* sp. n.**
  - ***favus* sp. n.**
  - ***fimbriata* sp. n.**
  - ***montana*** Kieffer, 1910
  - ***morsum* sp. n.**
  - ***nigrans* sp. n.**
  - ***nitidiuscula* sp. n.**
  - ***norma* sp. n.**
  - ***strigosa* sp. n.**
  - ***ventosus* sp. n.**
- ***NORDLANDERIA* gen. n.**
  - ***acis* sp. n.**
  - ***pallida* sp. n.**
  - ***plowa* sp. n.**
- ***RHOPTROMERIS*** Foerster, 1869
  - ***abba* sp. n.**
  - ***afer* sp. n.**
  - ***agis* sp. n.**
  - ***attis* sp. n.**
  - ***bicolor* sp. n.**
  - ***bupalus* sp. n.p**
  - ***cepheus* sp. n.**
  - ***connatus* sp. n.**
  - ***crito* sp. n.**
  - ***cubitalis* sp. n.**
  - ***diversa* sp. n.**
  - ***enna* sp. n.**
  - ***equalis* sp. n.**
  - ***hebe* sp. n.**
  - ***heptoma*** (Hartig, 1840)
  - ***navius* sp. n.**
  - ***naxos* sp. n.**
  - ***oeta* sp. n.**
  - ***pagasa* sp. n.**
  - ***pallidus* sp. n.**
  - ***persius* sp. n.**
  - ***punctata* sp. n.**
  - ***rufulus* sp. n.**
  - ***rutshuris* sp. n.**
  - ***rwanki* sp. n.**
  - ***sinis* sp. n.**
  - ***temesa* sp. n.**
  - ***thales* sp. n.**
  - ***velia* sp. n.**
  - ***zetes* sp. n.**
  - ***zeus* sp. n.**
- ***STENTORCEPS*** Quinlan, 1984
  - ***tubicen*** Quinlan, 1984
- ***TRICHOPLASTA*** Benoit, 1956
  - ***bicolor* sp. n.**
  - ***brevispina*** (Masner, 1960)
  - ***conica* sp. n.**
  - ***contrasta* sp. n.**
  - ***equalis* sp. n.**
  - ***extensus* sp. n.**
  - ***filiformis* sp. n.**
  - ***gracilicornis*** (Kieffer, 1910)
  - ***longispina*** (Masner, 1960)
  - ***medlia* sp. n.**
  - ***narrata* sp. n.**
  - ***novema* sp. n.**
  - ***octonarius* sp. n.**
  - ***quinclava* sp. n.**
  - ***rufus* sp. n.**
  - ***tanganyikensis*** (Weld, 1944)
    - *basilewskyi* Benoit, 1956
  - ***testacea* sp. n.**
  - ***unicolora* sp. n.**
  - ***zeus* sp. n.**

EUCOILIDAE Thomson

Eucoilidae Thomson, 1862: 397; Eady & Quinlan, 1963: 7. Type-genus: *Eucoila* Westwood [emended].
Eucoilinae Thomson; Foerster, 1869: 186.

The Eucoilidae is the largest and most widely distributed of the parasitic families in the Cynipoidea. The species form a distinctive group, distinguished from other Cynipoidea by the presence of a raised cup or plate (Fig. 359), which varies in shape and sculpture. They are internal parasites of dipterous larvae, emerging from the puparia (Quinlan, 1978). A number of them are parasites of cereal crop pests and are of sufficient economic importance to warrant close studies of their life histories (James, 1928; Imms, 1930, 1932; Jenni, 1951; Nostvik, 1954; Kerrich & Quinlan, 1960; Masner, 1958, 1960; Carton, 1977; Carton, Roualt & Kitano, 1977; Nordlander, 1978*b*; Barbotin, Carton & Kelner Pillault, 1979; Tsacas, 1979).

Nineteen genera are at present known to occur in the Afrotropical Region.

Key to the genera of Afrotropical Eucoilidae

1 Pronotal plate either distinct in anterodorsal view but not strongly projected forward (Fig. 18), or indistinct viewed dorsally, see *Nordlanderia* (Fig. 11), *Eucoilidea* (Fig. 83). First tergite of gaster, if visible, in form of a narrow ring, sometimes obscured by tergite 2 which never has a hairy ring at base, at most only a few sparse hairs on lower lateral margins; mesopleuron with a distinct suture, or weakly striate (*Microstilba*); mesoscutum shiny, notaulices present though sometimes aberrant or indicated by lines of hairs 2

– Pronotal plate distinct both in anterodorsal and lateral views, i.e. projected forward from pronotum (Fig. 2). First tergite of gaster, if visible, sometimes in the form of a crenulate ring, without a dense ring of hairs (visible in *Cothonaspis, Leptopilina* etc.), or tergite 2 with a dense ring of pubescence at base, not always complete on dorsal surface or sometimes with only a few sparse hairs in place of hairy ring; mesopleuron generally with a suture though this can be aberrant or absent; mesoscutum smooth and shiny, satiny or granulate; notaulices generally absent 6

2 First tergite of gaster not wholly visible in dry-mounted specimens either in dorsal or lateral view, at most in the form of a crescent, obscured by tergite 2 (Fig. 220); notaulices either faintly indicated or with a row of hairs in their place, if visible, at junction with scutellum either converging or parallel (Figs 17, 217) 3

– First tergite of gaster usually visible in dorsal and lateral views, distinctly crenulate (Fig. 22); notaulices distinct, sometimes converging sharply on approaching scutellum (Figs 217, 218) 5

3 Malar space area and supraclypeal area with short protrusions (Fig. 16); area below mesopleural suture coriaceous (Fig. 214); scutellar cup large, oval, excavate on lower half with a number of smaller fovea round outer edge (Fig. 15), scutellar disc reticulate, scutellar foveae aberrant; notaulices distinct, radial cell closed, almost as deep as wide; ♀ antenna clavate, ♂ antenna filiform, segment 3 curved, swollen distally .... ***NORDLANDERIA*** gen. n. (p. 288)

– Malar space and supraclypeal area without protrusions; area below mesopleural suture smooth, polished; scutellar cup variable in shape, scutellar disc punctate-reticulate (Figs 17, 21); notaulices distinct or aberrant; radial cell open or closed 4

4 Scutellar cup large, oval, with a pale rim, concave, punctate within the rim, scutellar disc reticulate-rugose, malar space and supraclypeal area without protrusions; notaulices obsolete anteriorly, widely separated at juncture with scutellar suture (Fig. 17).

Radial cell of forewing generally open, as wide as deep (specimens of this genus with a closed radial have been seen from Trinidad); ♀ antenna weakly clavate, ♂ with segment 3 weakly curved on outer margins .... ***DISORYGMA*** Foerster

– Scutellar cup small, polished; scutellar disc reticulate-punctate (Fig. 69); notaulices aberrant, at most represented by a row of hairs, pronotal plate adpressed but distinct, with a large lateral fovea on either side (Fig. 20) .... ***EALATA*** gen. n. (p. 257)

5 Notaulices broadened apically, sculptured (Fig. 21); scutellar cup very large, concave, extending to apex of scutellar disc, almost obscuring lateral margins of disc, basal margin of cup with a fringe of long setae, rim of cup edged with small fovea. First tergite of gaster distinct, in the form of a crenulate ring or collar, base of tergite 2 with a few scattered hairs (Fig. 22); ♀ antenna subclavate, ♂ with segment 3 curved and swollen distally ***DIGLYPHOSEMA*** Foerster

– Notaulices not generally broadened apically, always smooth; scutellar cup not obscuring scutellar disc laterally (Fig. 74) though sometimes obscuring disc apically, scutellar cup with a large central fovea, sometimes with a ring of minute foveae around lower half and close to edge of cup. First tergite of gaster crenulate, tergite 2 generally the largest viewed laterally. ♀ antenna variable, from filiform to subclavate, ♂ antenna filiform, the 4th segment curved, swollen apically; malar space with a distinct groove, without striations on either side ***EUCOILIDEA*** Ashmead (p. 259)

6 Scutellum produced apically to form a distinct spine or viewed dorsally and laterally conical (Figs 10, 350) and overhanging metanotum; pronotal plate with fovea on either side of median bridge, enclosed or open (Figs 30, 228). 7

– Scutellum not produced apically to form a spine or cone, either rounded, emarginate or truncate, sometimes with a tooth on each side but not tridentate, if triangular, or conical viewed dorsally, cup narrow, disc striate and wings emarginate 10

7 Scutellar cup narrow, declined posteriorly, almost reaching apex of scutellar disc (Fig. 10); radial cell of forewing open at base and apex (Fig. 9).

Side margins of pronotum, mesoscutum and lateral bars striate; pronotal plate with lateral fovea open (Fig. 24) .... ***AFRODONTASPIS*** Weld (p. 253)

– Scutellar cup variable in shape, not reaching apex of disc nor declined; radial cell of forewing open or closed on wing margin 8

8 Pronotal plate, viewed frontally, with a narrow or obsolete medial bridge, fovea on either side enclosed laterally (Fig. 323).

Scutellar disc sharply conical, sometimes almost spine- or beak-shaped, overhanging propodeum (Fig. 292); ♀ antenna clavate-subclavate or with segment 4 of antenna longer than 3, weakly curved on inner margin, sometimes swollen distally; ♂ antenna with segment 3 shorter than 4, 4 longer than each of following segments; radial cell of forewing open or closed (Figs 294, 299) .... ***TRICHOPLASTA*** Benoit (p. 310)

– Pronotal plate, viewed frontally, with a wide medial bridge, lateral fovea between anterior and posterior parts open, not bounded by a lateral fusion (Fig. 26) 9

9 Head either aciculate, striate or matt on temples and/or vertex; scutellar cup small, occasionally raised; fovea above propodeal spiracle with hairs (Neotropical)
ODONTEUCOILA Ashmead

– Head smooth and shining; scutellar cup large, not raised; fovea above propodeal spiracle shallow and hairless. (Neotropical).. ***CONEUCOELA*** Kieffer

10 Wing surface very lightly pubescent, at most with a few sparse hairs, most prominent on veins, apical half on both surfaces bare but dotted with hair bases on under surface, almost always with short apical hair fringe on posterior margins; radial cell of forewing closed, R_1 thinner on wing margin than Rs_2 (Fig. 27); pronotal plate, viewed dorsally, in form of collar, viewed anterodorsally, rounded, medial bridge large with lateral fovea open (Fig. 28) 11

– Wing surfaces densely pubescent, ciliate, with distinct hair fringe on apical margins; pronotal plate with lateral fovea open or closed, medial bridge variable in breadth (Fig. 26) 12

11 Scutellar cup narrow, declined posteriorly (the usual large posterior fovea not visible in dorsal view) (Fig. 29); base of forewing smoky, radial cell partially closed on wing margin; pronotum either side of pronotal plate canaliculate (Fig. 30); pronotal plate (Fig. 30); ♀ antenna subclavate-clavate, ♂ antennal segments 3 and 4 modified
BOTHROCHACIS Cameron

– Scutellar cup large, rounded, elevated, not declined posteriorly (*cf.* Fig. 43); base of forewing clear, radial cell nearly always closed on wing margin; pronotal plate in the form of a collar viewed dorsally (Fig. 28); ♀ antenna moniliform, ♂ antennal segment 4 swollen distally
EUCOILA Westwood

12 Pronotal plate with lateral fovea between anterior and posterior parts closed laterally (Fig. 246) 13

– Pronotal plate with lateral fovea open (Fig. 34).. 15

13 Head with pyriform protuberances on inner orbits of face (Figs 31, 32), supraclypeal area of face with a large trumpet-shaped protrusion........................ ***STENTORCEPS*** Quinlan (p. 309)

– Head without the above characters 14

14 Scutellar cup large, with a large central fovea and a small transverse fovea below it, scutellar disc smooth, polished; ♀ antenna filiform.................................... ***DARUNA*** Benoit

– Scutellar cup small, long and narrow with minute pits, scutellar disc reticulate to almost smooth and polished; ♀ antenna invariably clavate, rarely filiform, club segments usually darker than basal segments.

Anteroventral cavity of mesopleura distinct, some times reduced; propodeum densely pubescent; radial cell of forewing closed on wing margin ..... ***RHOPTROMERIS*** Foerster (p. 290)

15 First tergite of gaster distinct, in the form of a crenulate or furrowed ring, abruptly widened posteriorly. Second tergite of gaster with a few sparse hairs at base, never with a dense ring of hairs (Fig. 33); scutellar cup elliptical, scutellar disc rounded behind, surface with weak reticulate sculpture, sides of propodeum lacking pubescence; wings narrow, rounded apically, radial cell of forewing closed on wing margin though sometimes indistinctly so, cubitus (M) not or barely indicated.

♀ antenna with or without a distinct club, ♂ antenna filiform, 4th segment sinuate, longer than either 3rd or 5th (Fig. 360); pronotal plate with lateral fovea open (Fig. 60); anteroventral cavity of metapleura absent .... ***COTHONASPIS*** Hartig (p. 255)

– First tergite of gaster not always visible, if visible, tergite 2 with a dense ring of hairs at base and wings broad; or base of tergite 2 with a distinct ring of hairs, though neither dense nor complete on dorsal surface; scutellar cup variously shaped, disc sculpture variable, sides of propodeum with dense pubescence; wings broad, never narrow, radial cell of forewing open or closed, apex of forewing rounded or incised.. 16

16 Brachypterous or fully winged, apex of wings either incised, arcuate or truncate, cubitus (M) not distinct, radial cell of forewing distinctly open on wing margin, vein R_1 thickened at apex near margin of forewing, *2rm* thickened, areolet absent, $Rs+M$ usually absent (Figs 8, 177) or wings short, not extending to apex of gaster; scutellar cup small, not extending to apex of logitudinally striate scutellar disc which is either rounded, conical or in some species spine- or beak-shaped.

Tergite 2 of gaster with a hairy ring at base, not usually complete on dorsal surface (Fig. 36); ♀ antenna clavate, ♂ antenna filiform, segment 3 elongate, curved, viewed dorsally, outer margin flattened (Fig. 225) .... ***KLEIDOTOMA*** Westwood (p. 280)

– Fully winged, never brachypterous, apex of forewing rounded, rarely truncate, venation not as above, radial cell open or closed on wing margin, scutellar cup and disc variable in size, shape and sculpture, disc rarely striate 17

17 Mesopleural suture either absent or indistinct (Fig. 37); frons prominent in ♂, less so in ♀; wings in ♀ of normal length (generally shortened in British specimens); scutellar cup raised above level of scutellar disc which is striate to reticulate-rugose; sides of pronotal plate and propodeum with dense tufts of pubescence (usually yellowish white); tergite 2 of gaster with a dense felt-like ring of pubescence; antenna of ♀ filiform, segment 3 of ♂ antenna in type species equal to 4+5 (see note) (in African species 3 is shorter than 4+5; radial cell of forewing open or closed) .... ***GLAURASPIDIA*** Thomson

– Without the above combination of characters; mesopleural suture generally present; pronotum and propodeum without dense felt-like tufts; tergite 2 of gaster with hairy ring variable in density of pubescence; ♀ antenna usually clavate, ♂ antenna filiform, 3rd or 4th segment sometimes modified 18

18 Scutellar cup narrow, elliptical, disc reticulate-striate, rounded at apex; radial cell of forewing open on front margin (R_1 projecting slightly on the margin but not joining Rs_2 to form a closed radial cell) (Fig. 38); tergite 2 of gaster with a ring of pubescence, generally complete on dorsal surface.

♀ antenna clavate, ♂ antenna with segment 3 longer than 4, sharply curved on outer margin (Fig. 39), swollen distally; pronotal plate with lateral pits or fovea open (Fig. 40), with tufts of pubescence on either side (in some species mesopleural suture aberrant or absent) .... ***HEXACOLA*** Foerster (p. 272)

– Scutellar cup variable in shape, sculpture of scutellar disc variable, sometimes smooth, never striated as in *Kleidotoma*; radial cell of forewing open or closed on wing margin; tergite 2 of gaster with ring of pubescence at base dense or weak, sometimes complete on dorsal surface. 19

19 Tergite 2 of gaster with ring of hairs at base present but rather thin or sparse, not usually complete on dorsal surface, not obscuring tergite 1 which is crenulate to reticulate-crenulate (Fig. 41), abruptly widened posteriorly (anteroventral cavity of mesopleura present).

♂ antenna filiform, segments 3 and 4 subequal in length, 4th slightly flattened on outer margins (Fig. 361); ♀ antenna long, slender, with club segments sometimes only indicated by presence of rhinaria (Fig. 362) .... ***LEPTOPILINA*** Foerster

– Tergite 2 of gaster with a dense ring of pubescence at base, obscuring tergite 1 completely, complete on dorsal surface, not woolly in appearance.

Scutellar cup elevated, variable in size and shape from oval to almost circular, scutellar disc sculpture variable, from reticulate to reticulate-punctate, lateral bars of scutellum usually striate, especially on lateral margins; pronotal plate variable in size and shape, lateral fovea between anterior and posterior parts open 20

20 Scutellar cup almost flat, mirror-like, elliptical, if raised above level of disc then only very slightly (Fig. 44), scutellar disc closely punctate-reticulate, apical margin weakly conical (Fig. 44); lateral bars of scutellum weakly striated on lateral margins, polished dorsally; pronotal plate with lateral fovea between anterior and posterior parts small, not sharply delineated; apex of wing rather blunt, radial cell of forewing usually closed; ♀ antenna clavate or filiform, ♂ antenna filiform, 4th segment modified .... ***GANASPIS*** Foerster

– Scutellar cup almost circular, well elevated above scutellar disc, rugose to rugose-fovelate, apical margin rounded (Fig. 359), lateral bars of scutellum usually striate on dorsal and lateral surfaces; pronotal plate large, lateral fovea open, clearly delineated (Fig. 12); apex of forewing rounded, radial cell of forewing open or closed; ♀ antenna usually clavate, ♂ antenna filiform, segment 4 usually swollen (Fig. 46) .... ***TRYBLIOGRAPHA*** Foerster

AFRODONTASPIS Weld

Afrodontaspis Weld, 1961: 280. Type-species: *Coneucoela striatissima* Benoit, by original designation.

Diagnosis. ♀ antenna 13-segmented, subclavate, ♂ antenna 15-segmented. Pronotum, mesoscutum, mesopleura and lateral bars striate (Figs 10, 49, 50, 51). Scutellum with a long narrow cup extending almost to apex of scutellar disc, the usual large basal fovea on cup declined (not visible in dorsal view), scutellar disc falling sharply away from cup, with crenulate sculpture (Fig. 10); either side of pronotal plate with a tuft of dense yellow-white pubescence; base of tergite 2 of gaster with dense hairy ring obscuring tergite 1. Wings clear, not ciliate, dotted with hair bases, lower margins with a weak fringe of hairs.

Distribution. Zaire; Uganda.

Key to the species of *Afrodontaspis* Weld

1 Head behind eye (vertex) strigose, viewed frontally, strongly coriaceous, face coriaceous-reticulate. Pronotal plate (Fig. 47); mesoscutum with fine longitudinal striations (Fig. 50); apical segment of antenna 2× as long as wide; antenna yellowish, thorax and gaster reddish brown; segments 2–5 of gaster visible in lateral view (Fig. 48)........... ***striatissima*** (Benoit) (p. 254)

– Head behind eye (vertex) strongly aciculate, viewed frontally, face with weak radiating striae. Pronotal plate (Fig. 49); mesoscutum with broad longitudinal striations (Fig. 50); apical segment of antenna 2·5× as long as wide; antenna brown, thorax black, gaster reddish brown; segments 2–3 of gaster visible in lateral view .... ***lanatus*** sp. n. (p. 254)

Afrodontaspis lanatus sp. n.

(Figs 10, 49, 51, 52, 53, 54)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, 7–13 with rhinaria forming a weak club, 3–6 subequal in length and breadth, 7–13 each weakly swollen, 7–10 each same length as segments 3–6, 11–13 each longer than 7 (Fig. 52). Head, viewed frontally, longer than wide, vertex coriaceous, eyes further apart measured medially than height of an eye, face with closely spaced radiating striate sculpture converging towards frontal line area which is coriaceous (Fig. 53), malar groove not conspicuous in the striate sculpture, clypeus coriaceous, mandibles tri-dentate, occiput and vertex strigose-coriaceous. Pronotal plate produced forward, medial bridge between anterior and posterior parts narrow, fovea or lateral cavities open laterally (Fig. 49), these cavities filled with dense pubescence extending out from and on sides of fovea. Pronotum, viewed dorsally, striated; mesoscutum longitudinally striated, weakly so medially (Fig. 51); lateral bars of scutellum striate, scutellar fovea large, deep, separated by a long thin ridge with scutellar cup declined posteriorly, scutellar disc coriaceous in dorsal view, tongue-shaped apically, lateral margins of apex of disc crenulate (Fig. 10); carinae of propodeum bowed medially, pubescent on outer margins. Mesopleura completely transversely striate. Segment 1 of gaster completely obscured by dense ring of pubescence at base of tergite 2, woolly in appearance, tergites 2–3 of gaster visible in lateral view, segment 2 the largest, occupying most of visible area, ventral spine and hypoygium barely visible; coxae and femora finely coriaceous, tibiae and tarsi finely and densely strigose, pubescent, tibiae with two apical setae. Wings not ciliate, without apical hair fringe, surface of wings dotted with hair bases, radial cell of forewing open on wing margin (vein R_1 not reaching margin of wing, but indicated by pigmentation), $Rs+M$ and M very weakly indicated by a trace of pigmentation (Fig. 54). Colour: antenna yellowish brown, head and thorax blackish, gaster chestnut-red.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kaziba, affl.g. Senze s. affi. dr. Lufira, 1140 m, 15–27.ii.1948 (*G. F. de Witte*) (MRAC).

Paratypes. **Zaire**: 4 ♀ (MRAC). **Kenya**: 1 ♀ (BMNH).

REMARKS. This species is closely related to *striatissima* but separated by the different sculpturing on the head and mesoscutum. A larger and darker species. Size 3 mm.

Afrodontaspis striatissima (Benoit)

(Figs 10, 50, 56)

Coneucoela striatissima Benoit, 1956: 533. Holotype ♀, ZAIRE (MRAC) [examined].
Afrodontaspis striatissima (Benoit) Weld, 1961: 280.

DESCRIPTION. ♀. Antenna 13-segmented with 3-segmented club, club segments with rhinaria, remainder with granulate sculpture, segments 3-10 subequal in length, each wider apically than at base. Head, viewed frontally, strongly coriaceous, frontal area raised with weak impressed sculpture extending to base of clypeus, mandibles tridentate, head, viewed dorsally, finely coriaceous, back of head strigose. Pronotal plate large; pronotum longitudinally striate (with a dense tuft of pubescence on medial margins) (Fig. 50). Mesopleura strongly and broadly striated on lateral margins, weakly strigose to smooth medially. Lateral bars of scutellum striate. Scutellar disc ending in a blunt spine, scutellar fovea large, half as long as entire scutellum, scutellar cup very narrow, extending to base of scutellar spine, the usual large basal fovea on cup declined, dorsal surface of scutellar disc coriaceous, lateral margins sharply declined with large adpressed crenulations (*cf.* Fig. 10); carinae of propodeum bowed. Base of tergite 2 of gaster with dense ring of pubescence obscuring tergite 1 from view, tergites 2–5 visible in lateral view, the apical margins finely punctate, tergite 2 the largest (Fig. 48). Femur and tibia with reticulate-coriaceous sculpture, tibia with striated sculpture, tarsus 5-segmented. Wings with hair fringe on hind margin only, surface dotted with hair bases, not ciliate, radial cell of forewing open basally (vein R_1 not reaching margin of wing), $Rs+M$ and M not indicated (Fig. 56). Colour: antenna orange-yellow, head blackish red, thorax and gaster chestnut-red, legs orange-yellow.

♂. Antenna 15-segmented, segment 3 3·5 × length of 4, 4–15 subequal in length, narrower at apex; sculpture of head and thorax similar to ♀.

MATERIAL EXAMINED

Zaire: 1 ♀ (holotype), Rutshuro, xii.1937 (*J. Ghesquière*) (MRAC).
Uganda: 1 ♀, 20 ♂ (BMNH); **Zaire**: 44 ♀ (MRAC).

REMARKS. This species is separated from *lanatus* by the sculpture of the head and thorax. A much smaller species. Size 2 mm.

COTHONASPIS Hartig

Cothonaspis Hartig, 1840: 201. Type-species: *Cothonaspis pentatoma* Hartig, by original designation. *Psilosema* Keiffer, 1901: 160. Type-species: *Psilosema giraudi* Dalla Torre & Keiffer, by subsequent designation, Rowher & Fagan, 1917: 374. [Synonomy by Weld, 1952: 243.]

DIAGNOSIS. ♀ antenna 13-segmented with apical segments forming a club (Fig. 57), ♂ antenna 15-segmented, the fourth segment swollen, longer than third or fifth. Head, viewed frontally, spherical, as wide almost as thorax, genae broad, eyes round, further apart measured medially than height of an eye. Pronotal plate projected forward, anterior and posterior parts not fused laterally, i.e. fovea or cavities open (Fig. 34). Mesoscutum smooth, polished, notaulices absent, in some species long scattered hairs present; scutellar cup elongate, narrow, broader basally, scutellar disc with radiating striae, lateral bars smooth, polished, scutellar foveae ovoid, smooth. Propodeal carinae parallel, propodeum produced to form a neck-shaped nucha, hairless laterally. Segment 1 of gaster short, broad, in form of a crenulate ring, base of tergite 1 without a ring of pubescence, at most a few sparse hairs present, gaster compressed laterally. Wings narrow, rounded apically, surface normally pubescent, with a longish hair fringe on apical margins, radial cell of forewing closed on distal margin though in a few species it appears open due to absence of a complete vein, i.e. pigmentation only present.

DISTRIBUTION. Europe; South Africa; North and South America.

DISCUSSION. *Cothonaspis* is separated from the closely related *Leptopilina* by the form of the thorax and the lateral margins of the propodeum. In *Cothonaspis* the thorax is elongate and the lateral margins of the propodeum are not noticeably hairy. Two Afrotropical species have at one time or another been assigned to the supposed subgenera of *Cothonaspis*. *Erisphagia mahensis* Kieffer was placed in *Cothonaspis (Erisphagia)* by Weld (1952: 244), and Nordlander (1980) transferred it to *Leptopilina* Foerster. *Psilosema fenerivae* Kieffer, a species based on a male from Madagascar but not located, is not accounted for in this paper. Two further species are described and compared with *Cothonaspis pentatoma*, the type-species of the genus.

BIOLOGY. The European species of *Cothonaspis* are associated with Sepsidae in cow dung (Nordlander, 1976; Quinlan, 1978).

Key to the species of *Cothonaspis* Hartig

Females

1 Antennal club 5-segmented, apical segments not contrasted to basal or medial segments; scutellar cup not extending to apex of disc, apex of disc rounded (Fig. 57) 2

– Antennal club 7-segmented, apical 3–4 segments orange-yellow in contrast to the brownish basal and medial flagellar segments (Fig. 59); scutellar cup elongate, extending almost to apex of the almost truncate scutellar disc (Fig. 71); apex of gaster finely punctate....... **dulcis** sp. n. (p. 256)

2 Tergites 1–2 of gaster visible in lateral view, gaster without a dense hair patch, scutellar disc with radiating striate sculpture; mesopleura strigose above mesopleural suture; lateral bars of scutellum striate on dorsal surface; hind coxa clearly strigose.............. **pentatoma** Hartig (p. 256)

– Tergites 1–4 of gaster visible in lateral view, base of tergite 2 with a patch of short pubescence on lower lateral margins; scutellar disc with broken areolate sculpture; mesopleura smooth and polished above mesopleural suture; lateral bars of scutellum polished on dorsal surface; hind coxa smooth, polished.. **ealis** sp. n. (p. 256)

Cothonaspis dulcis sp. n.

(Figs 59, 60, 71)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, segments 3 and 4 subequal, 5 shorter than 4, 6 shorter than 5, 7-13 forming a distinct club, all club segments with rhinaria (Fig. 59). Head, viewed frontally, with eyes further apart than height of an eye measured medially, cheeks converging towards clypeal area, malar groove distinct. Pronotal plate projected forward, anterior and posterior parts bridged medially, lateral fovea open on margins (Fig. 60). Mesoscutum smooth, polished, scutellar fovea smooth, shallow, lateral bars polished, scutellar disc almost truncate viewed dorsally, surface reticulate-rugose, scutellar cup long, narrow, narrower apically than medially, extending almost to apex of disc (Fig. 71). Propodeal carinae parallel, weakly pubescent on lateral margins, mesopleurae smooth, polished, mesopleural suture complete, a few rugae present below suture adjacent to lateral margins of pronotal plate, metapleura polished. Segment 1 of gaster short, broad, crenulate, in form of a ring, tergite 2 the largest, tergites 3 and 4 visible in lateral view, apex of tergite 2 and whole of visible parts of 3 and 4 finely punctate, tergite 2 with a small tuft of hairs on lateral margins not prominent or obscuring tergite 1, hypopygium not pronounced, ventral spine not visible. Legs long, slender. Wings long, narrow, rounded apically, surface pubescent with apical hair fringe, radial cell of forewing closed on wing margin. Colour: antenna dark yellow basally, brownish medially, apical 3–4 segments light yellow, head reddish black, thorax and gaster chestnut-brown, legs orange-brown.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kibati, 1000 m, 10–12.i.1934 (*G. F. de Witte*) (MRAC).

Paratypes. **Zaire**: 21 ♀ (MRAC). **Madagascar**: 1 ♀ (MNHN).

Cothonaspis ealis sp. n.

(Figs 61, 62)

DESCRIPTION. ♀. Antenna 13-segmented, with 5-segmented club, segment 3 longer than 4, 4 longer than 5, 6–8 subequal, each slightly longer than 5 (Fig. 61). Head, viewed frontally, rounded, eyes oval, face smooth, shining, with sparse scattered hairs, malar groove percurrent, vertex smooth. Pronotal plate produced forward, anterior and posterior parts connected medially, lateral margins, i.e. fovea, open laterally (Fig. 62); pronotum weakly striated on dorsal surface adjacent to mesoscutum; mesoscutum smooth, polished, with a few scattered hairs; lateral bars of scutellum smooth, polished, scutellar fovea shallow, almost as broad as long, scutellar disc polished, with trace of broken striae, apex rounded, cup small, long, narrow. Propodeal carinae parallel, without pubescence on lateral margins, propodeum elongate, carinate, hairless; mesopleural suture complete, mesopleurae smooth, polished; metapleura ridged, anteroventral cavity distinct, with a few setae. Segment 1 of gaster short, broad, in the form of a crenulate ring, tergite 2 the largest, smooth, polished, without a ring of pubescence at base, impuncate, tergites 3 and 4 partially visible in lateral view, hypopygium not pronounced, ventral spine not visible. Legs short, robust, tarsal segments longer than tibia. Wings pubescent, margins ciliate, radial cell of forewing closed on wing margin. Colour: antenna light brown, head, thorax and gaster brown-black, legs yellowish.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Cape Town, Milnerton, i.1926 (*R. E. Turner*) (BMNH).

Cothonaspis fenerivae (Kieffer)

Psilosema fenerivae Kieffer, 1910*a*: 534; Weld, 1952: 243. Holotype ♂, MADAGASCAR: Fenerive, vii. (*Voeltzkow*) (depository unknown).

Kieffer's description is based on a male and could fit a number of species.

Cothonaspis pentatoma Hartig

(Figs 57, 58, 63)

Cothonaspis pentatoma Hartig, 1840: 201. Holotype ♀, GERMANY (MNHN) [examined].
Eucoila (Pentamerocera) pentatoma (Hartig) Kieffer, 1901: 175.
Cothonaspis (Cothonaspis) pentatoma Hartig Weld, 1952: 242.

Description. ♀. Antenna 13-segmented with a 5-segmented club, segment 3 subequal to 4+5, 4 longer than 5 (8th segment weakly swollen but not regarded as a club segment, rhinaria are not present as in the five apical segments) (Fig. 57). Head, viewed frontally, rounded, eyes normally rounded, smallish, malar space area striated, face with sparse hairs, maxillary palp 4-segmented, labial palp 2-segmented, vertex strigose. Pronotal plate projected forward, anterior and posterior parts connected medially, lateral margins open, i.e. fovea open laterally (Fig. 58); mesoscutum smooth, polished, with sparse hairs, notaulices absent. Lateral bars of scutellum striate dorsally, polished, scutellar fovea smooth, shallow, as broad as long, scutellar disc with longitudinal or radiating ridges, cup small, slightly longer than broad. Propodeal carinae pronounced, parallel, propodeum elongated in lateral view, a few sparse hairs present (Fig. 63). Mesoscutum, in lateral view, long, slender. Mesopleural suture complete, strigose above suture, metapleura ridged, anteroventral cavity indicated. Segment 1 of gaster broad, short, canaliculate, tergite 2 the largest in lateral view, with a few long hairs at its base. Legs long, slender, fore and mid-legs of similar size and shape, hind-leg larger, tarsi short, hind coxa strigose. Wings narrow, rounded apically, surface pubescent with hair fringe on apical margin, radial cell of forewing closed (sometimes indistinctly so, due to presence only of pigmentation, the vein becoming vestigial). Colour: antenna brownish, head and thorax black, gaster dark brownish black, chestnut-red basally. Legs brownish basally, yellowish apically.

Remarks. Although *pentatoma* appears to be known only from Europe it is included in the key to species to facilitate identification and comparison with the two Afrotropical species.

EALATA gen. n.

(Figs 19, 20, 69)

Type-species: *Ealata clava* sp. n.

Diagnosis. ♀ antenna 13-segmented, clavate, ♂ antenna 15-segmented, filiform, segment 3 curved, subequal in length to segment 4. Pronotal plate not projected forward, anterior part wider than posterior part, fovea large, not enclosed on lateral margin (Fig. 20). Mesoscutum smooth, polished, notaulices weakly indicated basally, foveae broader than long, kidney-shaped; scutellar disc reticulate-rugose, weakly rounded apically, scutellar cup oval, slightly longer than broad, raised, with a weak depression apically, with a pale-edged rim (Fig. 69). Propodeum with bowed carinae, pubescent on either side. Mesopleura smooth, polished, suture complete. Segment 1 of gaster partially visible, sculptured, in form of a crescent, tergite 2 the largest in lateral view, without a ring of pubescence at base, at most with a few scattered hairs on lateral margins. Wings pubescent, apical margins with a hair fringe, radial cell of forewing closed on wing margin (Fig. 19). Legs of normal size and shape, coxae with a fringe of hairs on margins viewed laterally, dark brown, femora, tibiae and tarsi orange-yellow with usual pubescence.

Distribution. Afrotropical Region.

Discussion. This genus superficially resembles *Leptopilina*. However, the pronotal plate is not projected forward, and the notaulices, though aberrant, are indicated at least on the anterior of the mesoscutum. Tergite 2 of the gaster has a few hairs present laterally, never with a ring of pubescence, however thin. *Ealata* is closely related to *Nordlanderia, Disorygma* and *Diglyphosema*. It is separated from *Disorygma* by the mesoscutum and the form of the scutellar cup.

Key to the species of *Ealata* gen. n.

1 Antenna of ♀ with 6-segmented club; hypopygium not protruding (Fig. 67) 2
– Antenna of ♀ with 7-segmented club; hypopygium protruding (exceptionally long) (Fig. 64)
marica sp. n. (p. 258)
2 Antennal segments 8–13 forming a distinct club, rhinaria very distinct on apical three segments, all club segments wider apically than basally in contrast to basal segments (Fig. 65)
saba sp. n. (p. 258)
– Antennal segments 8–13 forming a very weak club, rhinaria present, all segments at least 2 × as long as wide, not wider apically than basally (Fig. 66) .... **clava** sp. n. (p. 257)

Ealata clava sp. n.

(Figs 20, 66, 67, 69, 72)

Description. ♀. Antenna 13-segmented, clavate, segment 3 1·5 × length of 4, 4, 5 and 6 subequal in length, 7 almost twice length of 6, 8–13 forming a club though segment 7 could be mistaken for a club segment (see note), apical segment shorter than 11+12 (Fig. 66). ♂ antenna 15-segmented, filiform, 3 and 4 subequal in length, 3, viewed dorsally, weakly curved. Face, viewed frontally, smooth, polished, with scattered hairs, malar suture distinct, eyes weakly converging. Pronotum pubescent either side of pronotal plate, plate not projected forward, anterior part much wider than posterior part, lateral foveae large, not enclosed (Fig. 20). Mesoscutum on lateral margin of pronotum from tegulae to pronotal plate channelled, notaulices very weakly indicated anteriorly (best seen viewed laterally), lateral bars of scutellum polished, scutellar foveae shallow, polished, scutellar cup small, convex, polished, with apical depression, disc reticulate-rugose (Fig. 69), rounded apically. Propodeal carinae bowed, densely pubescent on either side. Mesopleural suture complete. Segment 1 of gaster partially visible, in form of crenulate ring, obscured in part by tergite 2, lateral margins of tergite 2 with a few sparse hairs at base; tergite 2 the largest in lateral view, remaining segments not always visible, surface smooth, shining, hypopygium pronounced (Fig. 67). Wing surface pubescent, apical margins with hair fringe, radial cell of forewing closed on the margin, cubitus (*M*) not indicated (Fig. 72). Legs long, slender. Colour: femora brownish yellow, head, thorax and gaster blackish, base of gaster orange, legs orange-yellow.

♂. Antenna 15-segmented, segment 3 weakly curved, same length as 4.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Eala, ii.1935 (*J. Ghesquière*) (MRAC).

Paratypes. **Cameroun**: 2 ♀ (BMNH). **Kenya**: 1 ♀ (BMNH). **Mauritius**: 1 ♂ (BMNH). **South Africa**: 2 ♀ (BMNH). **Uganda**: 2 ♀ (BMNH). **Principe Is.**: 1 ♀ (BMNH). **Zaire**: 34 ♀, 19 ♂ (MRAC).

DISCUSSION. This species is separated from others in the genus by the club segments; these can be easily counted and comprise seven segments, but rhinaria are not present on the seventh. The sixth segment, although very similar in shape to the other club segments, does not have rhinaria and is therefore not regarded as a true club segment.

Ealata marica sp. n.

(Figs 19, 20, 64, 69)

DESCRIPTION. ♀. Antenna 13-segmented, subclavate, segment 3 1·3 × length of 4, 4, 5 and 6 subequal in length, 7–13 forming a club, each club segment with rhinaria, weakly swollen medially, apical segment shorter than 11+12 (Fig. 66). Face, viewed frontally, smooth, polished, with scattered hairs, malar suture distinct, eyes as far apart measured medially as height of an eye. Pronotal plate not projected forward, anterior part wider than posterior part, the lateral foveae large, not enclosed (*cf.* Fig. 20). Mesoscutum channelled from lateral margins to pronotal plate, notaulices not indicated, sparse hairs present in their place, lateral bars of scutellum polished, scutellar foveae shallow, wider than long, scutellar cup small, slightly longer than wide, not extending to apex of disc, scutellar disc finely reticulate-rugose, apex rounded (*cf.* Fig. 69); propodeum obscured by pubescence, mesopleural suture complete, metapleura densely pubescent, propodeum extended. Segment 1 of gaster in form of a crenulate ring, obscured by base of tergite 2, tergite 2 the largest, with two or three hairs basally on lateral margins, remaining segments not visible, hypopygium long, narrow (Fig. 64). Wing surface densely pubescent, margins with apical hair fringe, radial cell of forewing closed on margin, long, narrow (Fig. 19). Legs short, stout, hind coxa swollen medially, tibia as long as tarsus. Colour: antenna orange-yellow, head, thorax and gaster dark brownish black, legs, coxa brownish black, femora, tibiae and tarsi orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kivu, Rutshuru, 1285 m, 11.vii.1935 (*G. F. de Witte*) (MRAC).

REMARKS. This species is easily distinguished by the antenna and extremely long, narrow hypopygium.

Ealata saba sp. n.

(Figs 19, 20, 65)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, with distinct 6-segmented club, club segments except apical slightly longer than broad, clearly wider apically than basally, apical segment as long as 11+12 (Fig. 65), segment 3 longer than 4, 4–7 subequal in length, 7 shorter than 8. Face, viewed frontally, smooth, polished, with scattered hairs, malar groove distinct, eyes weakly converging, mandibles tridentate. Pronotum sparsely pubescent either side of pronotal plate, plate not projected forward, anterior part much wider than posterior part, lateral foveae large, not enclosed (*cf.* Fig. 20). Mesoscutum smooth, polished, notaulices absent, a row of hairs in their place, lateral bars of scutellum polished, scutellar foveae wider than long, smooth, shallow, scutellar cup small, almost oval, scutellar disc reticulate-rugose with scattered pubescence, apex weakly conical viewed dorsally, propodeum elongate in lateral view, propodeal carinae bowed basally, inner surface sculptured. Mesopleural suture complete, metapleura ridged on upper half, anteroventral cavity with tuft of hairs. Segment 1 of gaster partially visible, in form of a crenulate ring, tergite 2 the largest, occupying whole of visible area in lateral view, obscuring tergite 1, base of tergite 2 without hairs, hypopygium not pronounced, with a few hairs on ventral surface. Wing surface pubescent with apical fringe of hairs, radial cell of forewing closed on wing margin, elongate (*cf.* Fig. 19); legs short and stout, hind coxa swollen, elongate, mid- and fore coxae smaller, femora short, swollen medially, tibiae and tarsi slender, fore and mid-tibiae shorter than tarsus, hind tibia and tarsus subequal in length. Colour: antenna brownish yellow, head and thorax brownish, gaster chestnut-red; legs: coxae orange, femora, tibiae and tarsi yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Nigeria**: Ibadan (*B. R. Critchley*) (BMNH).

Paratypes. **Nigeria**: 4 ♀ (BMNH). **Rhodesia**: 1 ♀ (BMNH). **South Africa**: 2 ♀ (BMNH). **Uganda**: 2 ♀ (BMNH). **Zaire**: 6 ♀ (MRAC).

REMARKS. This species is separated from *clava* by the distinctive antennal club (Fig. 65).

EUCOILIDEA Ashmead

(Figs 84, 86, 93, 101)

Eucoilidea Ashmead, 1887: 154. Type-species: *Eucoilidea canadensis* Ashmead, by subsequent designation, Ashmead, 1903: 60.

Afrostilba Benoit, 1956: 544. Type-species: *Afrostilba nitida* Benoit, by monotypy. **Syn. n.**

DIAGNOSIS. ♀ antenna usually 13-segmented, clavate to almost filiform, club segments distinguished by presence of rhinaria, ♂ antenna 15-segmented. Face smooth, shining, malar space with a distinct epistomal suture (malar ridge), mandibles tridentate. Pronotal plate weakly protruding viewed dorsally, cavities either side of median bridge open laterally (Fig. 101). Pronotum either side of pronotal plate polished to strongly aciculate. Mesoscutum smooth, polished, notaulices complete, distinct, converging on approach to scutellum where medial distance between notaulices can vary (Figs 86, 93); lateral bars of scutellum smooth, scutellar fovea deep, scutellar cup variable, from oval to round to elongate, scutellar disc usually visible laterally and apically though this is sometimes overlapped apically by scutellar cup, apex of disc rounded (Figs 86, 93, 97). Segment 1 of gaster sulcate, short, as broad as long, segment 2 occupying almost whole of visible part of gaster in lateral view (Fig. 14), surface without punctures at ×45 magnification. Wings with apical fringe of hairs, surface pubescent, radial cell of forewing closed on wing margin (Fig. 84).

DISCUSSION. The holotype of *Eucoilidea canadensis* Ashmead is a ♀ and has its antenna missing and is badly obscured by glue. Nineteen species, including seventeen newly described, are recognized from the Afrotropical region. Weld (1952) states that the antenna in the ♀ of *canadensis* has the third segment slightly longer than the fourth, without a distinct club, ♂ with segment three twice the length of four and strongly bent. In a ♀ from the West Indies the third segment is slightly shorter than four. The holotype would run in the present key to *dubia* but differs in the ratios of the antennal segments, the shape of the cup and the acuteness of the notaulices on approaching the scutellum. *Afrostilba* is here synonymised with *Eucoilidea* after comparison with related genera. First examination of *Afrostilba*, using Weld's key (1952) based on scutellar characters, distinguishes it from *Eucoilidea* by the absence of striations in the malar area of the face together with scutellar differences which also separate it from *Microstilba*. However, the emphasis given to the scutellar characters after comparison with the holotype of *Eucoilidea canadensis* and the species described here do not merit a separate genus. *Eucoilidea* has been recorded by Weld (1952) from the U.S.A., Mexico, Hawaii and the Philippines. The type-species is from Canada. Undescribed species of *Eucoilidea* from India and Singapore are in the BMNH. *Afrostilba nitida* Benoit is transferred to *Eucoilidea*.

DISTRIBUTION. North and South America, Hawaii, Philippines, South Africa.

Key to the Afrotropical species of *Eucoilidea* Ashmead

Females

1 Antenna 14-segmented; notaulices converging sharply towards scutellum (cf. Fig. 74); scutel-

lar disc reticulate-rugose, scutellar cup large, extending to apex of disc, obscuring apical margins; tergites 2–4 of gaster visible in lateral view, finely punctate .... ***extraria*** sp. n. (p. 265)

– Antenna 13-segmented; notaulices either sharply converging or gently converging towards scutellum (Figs 85, 97); scutellar disc visible laterally and sometimes apically; tergite 4 of gaster sometimes visible in lateral view, gaster either impunctate or punctate on apical margins (Figs 94, 100) 2

2 Apical margins of either tergite 2 of gaster, or 3 and 4 when visible, with dense fine punctures on apical margins, or apical tergites not strongly compressed (Fig. 77) 3

– Apical margins of gastral tergites without dense punctation or apical tergites of gaster strongly compressed laterally, with very sparse punctation on the apical margins (Figs 94, 116, 119).... 11

3 Antennal segments filiform or subclavate, segments 3 and 4 subequal in length (Fig. 81), or segment 4 longer than 3; *Rs* and *M* of forewing present or absent 6

– Antenna subclavate or filiform, segment 3 at least 1·2 × length of 4; segments 1–4 of gaster normally visible in lateral view 4

4 Antenna filiform, segments 4–13 with rhinaria (Fig. 129); veins *Rs+M* and *M* of forewing indicated (Fig. 130) 5

– Antenna clavate, club 8-segmented, segment 3 weakly curved (Figs 79, 144); veins *Rs+M* and *M* of forewing not indicated, radial cell of forewing 2 × as long as broad (Fig. 147); gaster finely punctate, tergites 1–4 normally visible in lateral view, hypopygium prominent (Fig. 145) .... ***trulla*** sp. n. (p. 271)

5 Tergites 1–2 of gaster visible in lateral view, tergite 2 densely, coarsely punctate on apical half; radial cell of forewing 2·6 × as long as wide (Fig. 78); scutellar cup extending to and obscuring apex of scutellar disc (*cf.* Fig. 132); legs yellowish .... ***marcellus*** sp. n. (p. 268)

– Tergites 1–3 of gaster visible in lateral view, tergites 2 and 3 finely punctate; radial cell of forewing 3·6 × as long as wide (Fig. 80); scutellar cup elongate, scutellar disc visible laterally and apically, legs bright orange-yellow .... ***tyrus*** sp. n. (p. 271)

6 Segment 4 of antenna clearly longer than 3, at least 1·2 × as long as wide (Fig. 81); notaulices converging sharply towards scutellum; pronotum strongly aciculate (Fig. 83) 7

– Segment 3 longer than or subequal in length to 4 (Fig. 127); notaulices converging sharply or gently towards scutellum 8

7 Antenna subclavate, segments 5–7 equal in length, 8–12 each progressively shorter than preceding segment; pronotum with long scattered pubescence; radial cell 2 × as long as wide (Fig. 82); segments 2–4 of gaster visible in lateral view .... ***lacerta*** sp. n. (p. 266)

– Antenna filiform, blackish; scutellar disc punctate-reticulate; radial cell 3 × as long as wide (Fig. 84) .... ***lana*** sp. n. (p. 267)

8 Notaulices not converging sharply towards juncture with scutellum (Fig. 86) 9

– Notaulices converging sharply towards juncture with scutellum (Fig. 85) 10

9 Antenna clavate; scutellar cup not extending to apex of scutellar disc (Fig. 85) ***nitida*** Benoit (p. 269)

– Antenna filiform; scutellar cup extending to apex of scutellar disc (Fig. 86) ...... ***leptis*** sp. n. (p. 267)

10 Antenna filiform, clearly longer than head-apex of gaster, segments 5–13 each progressively shorter than the preceding one, of equal width, two apical segments of equal length (Fig. 87), all much longer than broad; radial cell of forewing elongate, *Rs+M* and *M* of forewing indicated, not pigmented; scutellar disc punctate-reticulate-rugose, visible viewed dorsally on lateral and apical margins (*cf.* Fig. 114); side margins of pronotum weakly sculptured with long scattered hairs, distance between notaulices at juncture with scutellum as wide as a notaulix (*cf.* Fig. 114); segment 3 of gaster not visible in lateral view .... ***conversa*** sp. n. (p. 264)

– Antenna subclavate, at most slightly longer than head-apex of gaster; segments 6–12 each shorter than its preceding segment but each broader, apical segments weakly expanded to give a weak clavate appearance (Fig. 88); radial cell of forewing (Fig. 140), *Rs+M* and *M* not indicated; scutellar disc punctate-reticulate, visible on lateral and apical margins (Fig. 139); pronotum either side of pronotal plate aciculate (*cf.* Fig. 83); segment 3 of gaster visible in lateral view (*cf.* Fig. 77) .... ***parma*** sp. n. (p. 270)

11 Antennal segments 3 and 4 subequal in length, never with segment 4 longer than 3 (Fig. 89); scutellar cup elongate or oval 12

– Antennal segments 3 and 4 not subequal, either clearly longer or shorter than each other (Figs 105, 120); scutellar cup elongate 18

12 Antennal segment 4 at most 1·2 × length of 5, antenna subclavate (Figs 89, 90); radial cell of forewing elongate, at least 2 × as long as wide (Fig. 112), $Rs+M$ and M indicated, base of wing fumate or yellowish; scutellar cup elongate; gaster not conspicuously compressed laterally 13
– Antennal segments 4 and 5 subequal in length (Fig. 142), antenna filiform or subclavate; radial cell of forewing variable in length to width ratio, $Rs+M$ and M present or absent, base of forewing rarely fumate; scutellar disc sculpture variable, from rugose-punctate to punctate-reticulate, scutellar cup elongate or oval; notaulices converging towards scutellum, sometimes sharply; gaster sometimes strongly laterally compressed 14

13 Notaulices converging gently towards scutellum (Fig. 92), scutellar disc punctate-reticulate, visible laterally and apically, scutellar cup narrow (Fig. 92); antenna yellowish basally, brownish apically, subclavate (Fig. 89) ...... ***fetura*** sp. n. (p. 265)
– Notaulices sharply converging towards scutellum (Fig. 93); scutellar disc strigose, scutellar cup obscuring apical surface of disc (Figs 93, 141); antenna bright yellow.
Radial cell of forewing appearing open on anterior margin due to very weak pigmentation ...... ***pallida*** sp. n. (p. 269)

14 Gaster very strongly compressed laterally, tergites 3 and 4 visible in lateral view (dorsally they appear knife-edged and acutely angled to tergite 2) (Fig. 94).
Scutellar cup large, oval (Fig. 102) 15
– Gaster not conspicuously compressed laterally, swollen medially, tergites 3 and 4 not clearly visible in lateral view (Fig. 100) 16

15 Gastral segments, viewed laterally, impunctate (Fig. 94); antennal segments 3–6 subequal in length, apical antennal segments weakly swollen medially (Fig. 91), rhinaria present on segments 7–13 ...... ***compressa*** sp. n. (p. 263)
– Gastral segment 3 finely but densely punctate (Fig. 100); antenna subclavate, segment 5 very slightly shorter than 4, 4–13 each progressively broader than preceding segment to form a clavate antenna (Fig. 98), rhinaria present on segments 5–13 ...... ***urundiensis*** Benoit (p. 272)

16 Radial cell of forewing long, narrow (Fig. 95), 3·6 × as long as wide; antennal segments 3–8 subequal in length; notaulices converging gently towards scutellum; scutellar cup oval, disc coriaceous, visible laterally.
Tergite 2 of gaster only visible in lateral view, bright orange-yellow .. ***perangusta*** sp. n. (p. 270)
– Radial cell of forewing at most 3 × as long as wide; antennal segments 3–6 subequal in length; notaulices converging sharply or gently towards scutellum, scutellar cup variable in shape 17

17 Notaulices converging sharply towards scutellum; scutellar cup oval, scutellar disc visible on lateral margins only, viewed dorsally (Fig. 97); antenna subclavate, as long as head-apex of gaster (Fig. 103); tergites 2–4 of gaster visible in lateral view, hypopygium pronounced (*cf* Fig. 77) ...... ***bucca*** sp. n. (p. 263)
– Notaulices converging gently towards scutellum; scutellar cup elongate, scutellar disc visible laterally and apically in dorsal view (Fig. 104); antenna filiform, longer than head-apex of gaster (Fig. 113); tergite 4 of gaster not visible, ovipositor extended (*cf.* Fig. 94) ***advena*** sp. n. (p. 262)

18 Antenna clavate, segment 3 clearly longer than 4 (Fig. 120) 19
– Antenna filiform, segment 3 clearly shorter than 4 (Fig. 105).
Scutellar disc punctate, visible laterally and apically, scutellar cup elongate (*cf.* Fig. 132); notaulices converging gradually towards scutellum; radial cell of forewing short, broad (*cf.* Fig. 80) ...... ***dubia*** sp. n. (p. 264)

19 Notaulices converging sharply towards scutellum (*cf.* Fig. 114); scutellar cup elongate, narrow, scutellar disc visible laterally and apically; radial cell of forewing lightly pigmented (Fig. 111) ***furcula*** sp. n. (p. 266)
– Notaulices widely separated at juncture with scutellum (Fig. 132); scutellar cup large, oval, scutellar disc only visible viewed dorsally on lateral margins, radial cell of forewing heavily pigmented (*cf.* Fig. 130) ...... ***mauri*** sp. n. (p. 268)

Males

1 Apical margins of tergite 3 (4 when visible) of gaster with fine dense punctures (Fig. 106) 2
– Apical margins of tergite 3 without dense punctures 6

2 Segments 2–6 of gaster clearly visible in lateral view (Fig. 106); legs bright orange-yellow;

segment 3 of antenna curved, expanded apically, antenna black except for basal three segments brownish .... ***trulla*** sp. n. (p. 271)

– Segment 6 of gaster not visible in lateral view; legs never bright orange-yellow; segment 3 of antenna curved, sometimes expanded apically........ 3

3 Radial cell of forewing at most 2·5 × as long as broad (Fig. 135); antenna yellowish, segment 3 less than 1·2 × as long as segment 4 (Fig. 109), weakly curved........ 4

– Radial cell of forewing 3 × as long as broad (Fig. 130); antenna brownish black, segment 3 strongly curved, swollen apically (Fig. 110)........ 5

4 *Rs+M* and *M* of forewing clearly pigmented, base of wing infuscate or weakly fumate, radial cell 3 × as long as broad; pronotum either side of pronotal plate weakly sculptured; segment 3 of antenna strongly curved, weakly swollen apically (Fig. 108); notaulices sharply converging towards scutellum (*cf.* Fig. 114)........ ***conversa*** sp. n. (p. 263)

– *Rs+M* and *M* of forewing not pigmented, base of wing sometimes infuscate, radial cell 4 × as long as broad; pronotum either side of pronotal plate smooth; segment 3 of antenna curved, strongly swollen apically (Fig. 115); notaulices converging gently towards scutellum (Fig. 85) ***nitida*** Benoit (p. 269)

5 Segment 3 of antenna at most 1·2 × length of 4, weakly curved (Fig. 109); wings weakly fuscous basally........ ***lana*** sp. n. (p. 267)

– Segment 3 of antenna 1·6 × length of 4, strongly curved, swollen apically (Fig. 110); wings hyaline........ ***marcellus*** sp. n. (p. 268)

6 Segment 3 of antenna 1·5 × length of 4, weakly curved on outer margins, swollen distally (Fig. 107), 4–10 each decreasing in length (each segment shorter than preceding one), 11–13 subequal, shorter than 10, all segments black; forewing with vein R_1 thinner and less strongly pigmented than Rs_1 or Rs_2, $Rs+M$ and M not indicated, forewing not infuscate basally (Fig. 111); scutellar disc reticulate-rugose, scutellar cup elongate (longer than wide), not extending to apex of disc (Fig. 114); sides of pronotum not sculptured........ ***furcula*** sp. n. (p. 266)

– Segment 3 of antenna at most 1·2 × length of 4, weakly curved on outer margin, sometimes swollen distally (Fig. 143), 4–5 subequal, 6–8 subequal, each shorter than 5, 9–10 subequal, each shorter than 8, 11–14 shorter than 8, each progressively shorter than the preceding segment, basal segments brownish yellow, apical segments darker; forewing with veins R_1, Rs_1 and Rs_2 of equal thickness, base of wing sometimes infuscate; side margins of pronotum with or without sculpture; scutellar disc either punctate-reticulate or rugose, scutellar cup either as wide as long or longer than wide........ 7

7 Notaulices converging gradually towards scutellum (Fig. 92); scutellar cup elongate, narrow, scutellar disc punctate-reticulate, visible in lateral and apical view; side margins of pronotum with canaliculate sculpture; wings with conspicuous fuscous or smoky base (Fig. 112) (difficult to separate from *advena*)........ ***fetura*** sp. n. (p. 265)

– Notaulices converging sharply at a point two-thirds of way towards scutellum (*cf.* Fig. 114); scutellar cup elongate or oval, lateral margins only of scutellar disc visible in dorsal view, apex of disc obscured by cup (*cf.* Fig. 114); side margins of pronotum without sculpture; wing not fumate basally........ 8

8 Radial cell of forewing at least 3 × as long as wide; scutellar cup almost as wide as long, truncated apically (*cf.* Fig. 114), scutellar disc rugose; pronotum with scattered pubescence on lateral margins; tergites 1–4 visible in lateral view........ ***perangusta*** sp. n. (p. 270)

– Radial cell of forewing at most 2 × as long as wide (Fig. 95); scutellar cup longer than wide, oval, rounded apically (Fig. 104); scutellar disc punctate-reticulate; pronotum sculptured on lateral margins........ ***advena*** (p. 262); ***bucca***-group; ***compressa***-group

Eucoilidea advena sp. n.

(Figs 94, 101, 112, 113)

DESCRIPTION. ♀. Antenna 13-segmented, filiform, segments 3–5 subequal, 6–10 each progressively shorter than preceding segment (Fig. 113). Head, viewed frontally, smooth, shining, frontal line not pronounced, malar space with epistomal suture, mandibles bidentate, cheeks converging sharply, eyes further apart measured medially than height of an eye. Pronotal plate not conspicuous, lateral foveae not enclosed, i.e. open (*cf.* Fig. 101); mesoscutum with distinct notaulices, converging gently on approach to scutellum but not merging, scutellar disc rugose-reticulate, visible laterally and posteriorly, scutellar cup longer than broad, apical half with a large fovea (Fig. 104), scutellar foveae deep, lateral bars of scutellum broad and polished; propodeum with parallel carinae, mesopleura smooth, shining, with a distinct suture. Segment 1 of gaster short, crenulate, as wide as long, segment 2 the largest, occupying most of visible area in lateral view, segment 3 partially visible in lateral view, gaster impunctate, hypopygium with long basal setae, ovipositor sheath long (*cf.* Fig. 94). Legs yellowish orange, tibiae with two apical spurs, claws simple. Wings pubescent on surface, with apical fringe of hairs, radial cell of forewing closed on wing margin, elongate, *Rs+M* and *M* indicated, pigmented basally, base of wing with a smoky appearance (*cf.* Fig. 112). Colour: antenna yellow basally, apical segments dark, head and thorax black, gaster chestnut-brown-black, legs yellowish orange.

♂. Antenna 15-segmented, filiform, segment 3 the largest, weakly curved on inner margin, twisted and excavate medially on outer margin (included by association).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Rutshuru (riv. Kanzarue), 1200 m, 16.vii.1935 (*G. F. de Witte*) (MRAC).

Paratypes. **Cameroun**: 4 ♀ (BMNH). **Kenya**: 5 ♂ (BMNH). **Rhodesia**: 2 ♀, 2 ♂ (BMNH). **South Africa**: 5 ♀, 4 ♂ (BMNH). **Southern Yemen**: 1 ♀ (BMNH). **Uganda**: 2 ♀, 5 ♂ (BMNH), 1 ♂ (ZMC). **Zaire**: 198 ♀, 35 ♂ (MRAC). **Zambia**: 1 ♀, 2 ♂ (BMNH). **Zimbabwe**: 1 ♀ (BMNH).

REMARKS. This species is closely related to *bucca* but is distinguished by the length of the scutellar cup, the shape of the pronotal plate and the convergence of the notaulices.

Eucoilidea bucca sp. n.

(Figs 97, 103)

DESCRIPTION. ♀. Antenna 13-segmented, subclavate, segments 3–6 subequal in length, 9–11 equal in length (Fig. 103). Face, viewed frontally, smooth, polished, malar space with epistomal suture, eyes further apart, measured medially, than height of an eye. Pronotum either side of pronotal plate weakly aciculate. Mesoscutum smooth, polished, notaulices distinct, converging sharply towards scutellum two-thirds of way from posterior (Fig. 97); scutellar fovea deep, smooth, shining, scutellar cup large, with a large central fovea, the periphery with a ring of smaller fovea; scutellar disc reticulate-rugose with long hairs on its apex; carinae of propodeum diverging at base, either side of carinae with sparse hairs, medial area with scattered hairs; mesopleural suture distinct, surface smooth, polished. Segment 1 of gaster short, wider than long, strongly crenulate, tergite 2 the largest in lateral view, tergites 3 and 4 partially visible, hypopygium viewed laterally, broad, ventral surface with long hairs, ventral spine as long as hypopygium, legs orange-yellow, hind metatarsus as long as tarsal segments 2–4 combined, tibia with two apical spurs, tarsal claws simple. Wings pubescent on surface, apical margins with a hair fringe, radial cell of forewing closed on margin, 2 × as long as broad, *Rs+M* and *M* weakly indicated, base of wing with a smoky hue. Colour: antenna with basal segments yellowish, apical segments blackish, head and thorax black, gaster dark chestnut-red, legs yellowish.

♂. Antenna 15-segmented (included by association).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: St Edouard, Kamanda, 8.iv.1936 (*L. Lippens*) (MRAC).

Paratypes. **Ethiopia**: 1 ♂ (BMNH). **Kenya**: 8 ♀ (BMNH). **South Africa**: 3 ♀ (BMNH). **Uganda**: 2 ♀ (BMNH). **Yemen**: 1 ♀ (BMNH). **Zaire**: 121 ♀, 7 ♂ (MRAC). **Zambia**: 1 ♂ (BMNH).

HOST DATA. 1 ♀ from South Africa is labelled ex *Munroella myiopitina* Bezzi (Trypetidae).

REMARKS. Superficially very similar to *advena* but differing in the shape of the pronotal plate.

Eucoilidea compressa sp. n.

(Figs 91, 94, 97, 121, 128)

DESCRIPTION. ♀. 13-segmented, filiform, segments 3–6 subequal, 7–13 with rhinaria, weakly swollen medially (Fig. 91). Face, viewed frontally, smooth, polished, with dense pubescence either side of frontal area, eyes weakly converging towards clypeus, eyes further apart than height of an eye measured medially. Pronotal plate very weakly produced forward, anterior and posterior parts fused medially by a bridge, fovea on either side open (*cf.* Fig. 128); pronotum either side of pronotal plate with scattered setae. Mesoscutum smooth, polished, notaulices distinct, converging sharply towards scutellum at a point two-thirds of way towards scutellum but not meeting at juncture; lateral bars of scutellum smooth, polished, scutellar fovea smooth, polished, shallow, scutellar disc reticulate-rugose, rounded apically, visible on lateral margins, scutellar cup large, broad, extending almost to apex of disc, rim of cup lighter than central area which has large fovea, outer margins of cup with small pits or fovea on lower half adjacent to rim (*cf.* Fig. 97). Mesopleural suture distinct, surface smooth, polished, metapleura with a dense tuft of pubescence on anteroventral margin; propodeal carinae weakly bowed medially, obscured by dense pubescence. Segment 1 of gaster short, as wide as long, crenulate, tergites 1–4 visible in lateral view (Fig. 94), tergite 2 the largest with a few sparse hairs on lateral margins at base, 2–4 impunctate, lenticular in shape, hypopygium not pronounced, ovipositor short. Legs orange, coxa elongate, swollen basally, trochanters elongate, femur and tibia normal, hind metatarsus as long as tarsal segments 2–4 combined. Wing surface pubescent, apical fringe of hairs short, radial cell of forewing closed on wing margin, twice as long as wide measured medially (Fig. 121). *Rs+M* and *M* indicated, weakly pigmented. Colour: antenna orange-yellow, head and thorax black, gaster orange-yellow.

♂. Antenna 15-segmented, 3rd segment curved, swollen distally (included by association).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: P. N. U. Lusifiga (1700 m, 11–18.vii.1947 (*Mis. G. F. de Witte*) (MRAC).

Paratypes. **Kenya**: 4 ♀, 3 ♂ (BMNH). **South Africa**: 3 ♀ (BMNH). **Uganda**: 1 ♂ (BMNH). **Zaire**: 35 ♀ (MRAC). **Zimbabwe**: 4 ♀ (BMNH).

REMARKS. This species is closely related to *urundiensis* but is distinguished by the shape of the antenna.

Eucoilidea conversa sp. n.

(Figs 85, 87, 108)

DESCRIPTION. ♀. Antenna 13-segmented, almost filiform, segment 3 longer than 4, all flagellar segments at least twice as long as wide, segments 5–13 each progressively shorter than preceding segment, all longer than segment 4 (Fig. 87), all segments of equal width. Face, viewed frontally, smooth, shining; notaulices distinct, converging sharply towards scutellum two-thirds of distance from it, scutellar foveae smooth, polished, deep, scutellar disc reticulate-rugose with long scattered hairs not obscured by scutellar cup, scutellar cup elongate, longer than broad, with small pits or fovea around rim of cup, medial area with a large fovea (*cf.* Fig. 85); carinae of propodeum indistinct, sculptured medially. Mesopleura smooth, polished, suture complete. Segment 1 of gaster wider than long, crenulate, segment 2 the largest in lateral view, apical half with dense punctures, remaining segments not visible, hypopygium short, not generally visible. Legs orange-yellow, metatarsus as long as tarsal segments 2–4 combined, tibia with two apical spurs, tarsal claws simple. Wings pubescent on surface, apical hair fringe distinct, radial cell of forewing closed on wing margin, veins *Rs+M* and *M* indicated, not pigmented, radial cell almost 3 × as long as broad, *2rm* as broad as long. Colour: antenna yellowish basally, brownish apically (entirely yellow in Mauritian specimen), head and thorax blackish, gaster chestnut-brown, legs yellow.

♂. Antenna 15-segmented, filiform, segment 3 curved, longer than 4 (Fig. 108).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: 3.i.1952 (*H. de Saeger*) (MRAC).

Paratypes. **Cameroun**: 1 ♂ (BMNH). **Gold Coast**: 20 ♀, 3 ♂ (BMNH). **Kenya**: 6 ♀, 4 ♂ (BMNH); 1 ♀ (ZMC). **Madagascar**: 8 ♀, 3 ♂ (BMNH); 10 ♀, 6 ♂ (MRAC); 1 ♂ (MNHN). **Mauritius**: 1 ♀, 1 ♂ (BMNH). **Nigeria**: 7 ♀, 10 ♂ (BMNH). **South Africa**: 3 ♀, 1 ♂ (BMNH). **Tanzania**: 1 ♀ (BMNH). **Uganda**: 20 ♀ (BMNH). **Zimbabwe**: 5 ♀, 2 ♂ (BMNH).

REMARKS. This species is similar to *parma* but the antennae have an overall filiform appearance; it is also very close to *nitida* but is distinguished by the shape of the antenna and the notaulices.

Eucoilidea dubia sp. n.

(Fig. 116)

DESCRIPTION. ♀. Antenna 13-segmented, filiform, 5 shorter than 4, 4 and 5 subequal in length, 6 and 7 subequal, each shorter than 5, 8 shorter than 7, 9 and 10 each shorter than 8, subequal in length, 11 shorter than 10, 12 shorter than 11, 13 longer than 12. Head, viewed frontally, smooth, polished, malar space with a distinct ridge with scattered setae either side of supraclypeal area, mandibles dentate, eyes measured medially as far apart as height of an eye. Pronotum weakly pubescent, aciculate either side of pronotal plate. Pronotal plate small, not protruding. Mesoscutum smooth, polished, notaulices distinct, converging apically, but not meeting, scutellar fovea deep, lateral bars of scutellum smooth, polished, scutellar cup elliptical, longer than wide, not extending to apex of disc, scutellar disc reticulate-rugose with apical fringe of long hairs; propodeal carinae parallel. Segment 1 of gaster as wide as long, short, crenulate, segment 2 of gaster the largest in lateral view, smooth, impunctate, other segments not visible in lateral or dorsal view, hypopygium not projecting, with long hairs on ventral surface, ovipositor usually projecting, gaster as in Fig. 116. Legs yellowish orange, tibiae with two apical spurs, tarsal claws simple. Wing surface pubescent, apical margins with a hair fringe, radial cell of forewing closed, longer than broad, *Rs+M* and *M* indicated, base of wing pigmented. Colour: antenna orange-yellow basally, apical segments brownish, head and thorax black, gaster reddish basally, blackish apically.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: E. Cape Province, Katberg, 4,000 ft (1,220 m), xii.1932 (*R. E. Turner*) (BMNH).

Paratypes. **South Africa**: 8 ♀ (BMNH). **Zaire**: 17 ♀ (MRAC).

REMARKS. This species is related to *mauri* but differs in the form of antennae and the notaulices.

Eucoilidea extraria sp. n.

(Figs 76, 77, 97, 123, 128)

DESCRIPTION. ♀. Antenna 14-segmented, subclavate, 8–14 forming a weak club, segments 3–8 subequal in length, 9–11 subequal, shorter than preceding segments, 12 and 13 each shorter than segment 11, apical segment as long as segment 3 (Fig. 76). Head, viewed frontally, smooth, polished, frontal area raised, malar space with a distinct carina, mandibles tridentate, eyes diverging at top and bottom. Pronotal plate weakly protruding, pronotum either side of plate smooth, weakly pubescent, pronotal plate fovea elongate, open on lateral margins (*cf.* Fig. 128). Mesoscutum smooth, shining, with weak crenulate sculpture on margins, juncture with pronotum crimped, notaulices distinct, sharply converging at a point two-thirds from pronotum (in outline similar to a wine glass) (*cf.* Fig. 97); scutellar disc punctate-reticulate, scutellar cup very large, almost as wide as long, with a large central fovea, the rim of cup with a ring of smaller fovea, scutellar disc viewed dorsally, visible only on lateral margins. Mesopleura smooth, shining, with a distinct suture; propodeal carina diverging basally. Segment 1 of gaster viewed dorsally, wider than long, strongly crenulate (*cf.* Fig. 77), segment 2, viewed laterally, the largest, apical quarter with widely scattered punctures, segment 3 partially visible, remaining segments not visible, hypopygium distinct, ovipositor as long as visible part of hypopygium. Legs orange-yellow, tibiae with two apical spurs, claws simple. Wing surface pubescent, apical margins with a fringe of hairs, radial cell of forewing closed, longer than broad, *Rs+M* and *M* weakly indicated (Fig. 123). Colour: antenna dark orange-yellow except apical segments dark brown, head and thorax black, gaster dark chestnut-red-black.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Madagascar**: La Mandrake, ii.1944 (*A. Seyrig*) (MRAC).

Paratype. 1 ♀, same data as holotype (MRAC).

REMARKS. This species is easily distinguished by the extra segment in the antenna, the very large scutellar cup and the almost completely orange antenna.

Eucoilidea fetura sp. n.

(Figs 89, 92, 112, 117, 118)

DESCRIPTION. ♀. Antenna 13-segmented, segments 3 and 4 equal in length, 5–12 each shorter than 4, overall shape filiform (Fig. 89). Head, viewed frontally, smooth, shining, face with scattered hairs, mandibles tridentate, eyes further apart at top of eyes than medially (*cf.* Fig. 117), malar suture distinct. Pronotal plate not protruding, with elongate fovea on either side of medial bridge (*cf.* Fig. 128). Pronotum with sparse pubescence either side of plate; mesoscutum smooth, polished, notaulices distinct, converging in apical third towards scutellum, lateral bars of scutellum smooth, scutellar fovea large, scutellar cup elliptical with a large fovea basally, scutellar disc punctate-reticulate, disc visible laterally and apically (Fig. 92), apex of disc with a fringe of long hairs; mesopleural suture distinct; propodeum sculptured, carinae indistinct. Segment 1 of gaster short, as broad as long, crenulate, segment 2 the largest, occupying most of visible area in lateral view, segment 3 partially visible, gaster impunctate, hypopygium short with sparse hairs ventrally, ovipositor protruding (Fig. 118). Legs yellowish orange, tibiae with two apical spurs, claws simple. Wings pubescent, margins of wings with a hair fringe, radial cell of forewing closed on wing margin, longer than wide, *Rs+M* and *M* indicated, base of wings infuscate (Fig. 112). Colour: antenna yellow basally, with apical four segments blackish, head and thorax black, gaster blackish, chestnut-red basally.

♂. Antenna 15-segmented, filiform, segment 3 curved, weakly swollen apically.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, ii.1979 (*A. Watsham*) (BMNH).

Paratypes. **Cameroun**: 4 ♀ (BMNH). **Nigeria**: 2 ♀ (BMNH). **South Africa**: 6 ♀, 4 ♂ (BMNH). **Senegal**: 1 ♀ (BMNH). **Uganda**: 4 ♀, 1 ♂ (BMNH); 1 ♀ (ZMC). **Zaire**: 26 ♀, 38 ♂ (MRAC).

REMARKS. This species is easily confused with *advena* but in the female the overall shape and the ratios of the antennal segments distinguish it. In both sexes the apex of the wings tends to be smoky.

Eucoilidea furcula sp. n.

(Figs 85, 107, 111, 119, 120)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, segment 3 longer than 4, 4–10 subequal in length, 11–12 subequal, each shorter than 10 (Fig. 120). Head, viewed frontally, smooth, polished, with scattered hairs either side of supraclypeal area, mandibles tridentate, eyes as far apart as the height of an eye measured medially, malar suture distinct. Pronotal plate not protruding, with lateral fovea open; pronotum weakly pubescent either side of pronotal plate; mesoscutum smooth, polished, notaulices distinct, converging sharply on nearing scutellum, not confluent, scutellar foveae large, shallow, lateral bars smooth, scutellar cup large with apical depression, longer than broad measured medially, scutellar disc reticulate-rugose, visible laterally and apically, viewed dorsally (*cf.* Fig. 85), apex of disc with a fringe of long hairs; mesopleural suture distinct, metapleura weakly ridged, anteroventral cavity with a tuft of hairs; propodeal carinae close, parallel, medially with canaliculate sculpture. Segment 1 of gaster short, as broad as long, crenulate, sometimes obscured by tergite 2. Segment 2 the largest in lateral view, with two or three hairs present basally on lateral margins, gaster impunctate, remaining segments of gaster not visible, hypopygium not pronounced, with sparse hairs present on ventral surface, ovipositor protruding, gaster (Fig. 119). Legs yellowish orange, tibiae with two apical spines, claws simple. Wing surface pubescent, apical margins with a hair fringe, radial cell of forewing closed, lightly pigmented, as broad as long measured medially, *Rs+M* and *M* not indicated (Fig. 111), base of wing weakly infuscate. Colour: antenna pale brownish yellow, head and thorax black, gaster dark chestnut-brown.

♂. Antenna 15-segmented, segment 3 1·5 × length of 4 (Fig. 107).

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Witzenberg Vall, SW. Cape Province, 3,000 ft [915 m], 19.i.1921 (*R. E. Turner*) (BMNH).

Paratypes. **Ethiopia**: 1 ♀, 1 ♂ (BMNH). **Kenya**: 2 ♀, 1 ♂ (BMNH); 1 ♀ (ZMC). **South Africa**: 50 ♀, 15 ♂ (BMNH). **Uganda**: 6 ♀, 4 ♂ (BMNH). **Zaire**: 1 ♀ (MRAC). **Zimbabwe**: 6 ♀, 1 ♂ (BMNH).

REMARKS. This species is distinguished from others by the shortish clavate antenna, the third segment being distinctly longer than the fourth. It is separated from *mauri*, a closely related species, by the form of the notaulices and the shape of the scutellar cup.

Eucoilidea lacerta sp. n.

(Figs 81, 82, 85, 117)

DESCRIPTION. ♀. Antenna 13-segmented, very weakly club-shaped, segment 3 shorter than 4 (Fig. 81), 5–13 each progressively shorter than the preceding segment, all with rhinaria. Face smooth, shining, with sparse scattered pubescence, eyes further apart measured at top of eye than at bottom, malar suture distinct (Fig. 117). Pronotal plate not sharply protruding, pronotum either side of pronotal plate with long scattered hairs, surface aciculate. Mesoscutum smooth, polished, notaulices distinct, converging towards scutellar suture, anterior parallel lines weakly indicated; lateral bars of scutellum polished, scutellar foveae shallow, polished, scutellar cup long, wide, extending almost to apex of scutellar disc, apical half with a large depression, rim with a border of smaller pits along edge of lower margins, scutellar disc rugose-reticulate, apex with a fringe of long hairs, apical margin obscured by scutellar cup (*cf.* Fig. 85). Mesopleura smooth, polished, suture distinct; propodeum with pronounced parallel carinae. Segment 1 of gaster short, as broad as long, crenulate, segment 2 the largest viewed laterally, punctate on apical margins, segment 3 partially visible, hypopygium short, ovipositor not protruding. Legs yellowish orange, with scattered setae, tarsal claws simple. Wing surface pubescent, with apical fringe of hairs, radial cell of forewing closed on margin, elongate, *Rs+M* and *M* indicated (Fig. 82). Colour: antenna yellow basally, 6–12 dark, head, thorax and first segment of gaster black, second segment of gaster chestnut-brown at base, becoming black towards apex.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Ivory Coast**: Pakobo, 44 km N. Tlassale, x.1962 (*J. Decelle*) (MRAC).

Paratypes. **Ivory Coast**: 45 ♀, same data as holotype. **Zaire**: 4 ♀ (MRAC).

REMARKS. The females of this species and *marcellus* are distinguished by the 4th segment of the antenna being clearly longer than the 3rd.

Eucoilidea lana sp. n.

(Figs 86, 109, 124, 125, 126)

DESCRIPTION. ♀. Antenna 13-segmented, filiform, segment 4 longer than 3, 7–13 each progressively shorter than preceding segment, all of equal width, rhinaria present on segments 4–13 (Fig. 124). Face, viewed frontally, smooth, shining, malar space with a distinct epistomal suture, eyes diverging at top and bottom. Pronotal plate not projected forward, foveae large, open on lateral margins of medial bridge (Fig. 125). Pronotum either side of pronotal plate strongly aciculate (Fig. 125). Mesoscutum smooth, polished, notaulices distinct, converging sharply towards scutellum two-thirds from it but not confluent (Fig. 114), scutellar fovea deep, lateral bars polished, scutellar disc punctate-reticulate, with long scattered hairs on apical margin, scutellar disc visible on lateral margins, viewed dorsally, apex obscured by large scutellar cup, cup with a large apical depression, the rim with small pits along edge (*cf.* Fig. 86); carinae of propodeum weakly bowed medially, pubescent on either side. Mesopleura with a distinct suture. Segment 1 of gaster short, as broad as long, crenulate, segment 2 the largest in lateral view, with dense punctures on apical margins, other segments not visible. Legs brownish yellow, metatarsus as long as tarsal segments 2–4 combined, tibiae with 2 apical spurs, tarsal claws simple, wing surface pubescent, apical margins with a hair fringe, radial cell of forewing closed on margin, 2 × as long as wide, *Rs+M* and *M* weakly indicated. Colour: antenna blackish, head and thorax black, gaster chestnut-red.

♂. Antenna 15-segmented, filiform, segment 3 the largest, strongly curved, swollen apically (Figs 109, 126).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kivu, Nyyongera (near Rutshuru), Batumba, 1218 m, 17.vii.1935 (MRAC).

Paratypes. **Zaire**: 4 ♀ (MRAC).

REMARKS. This species is very close to *lacerta* but differs from it on the antennal shape and the sculpture of the scutellar disc. The male is similar to *marcellus* but differs by the length of the antennal segments.

Eucoilidea leptis sp. n.

(Figs 86, 127, 128)

DESCRIPTION. ♀. Antenna 13-segmented, filiform, without trace of a distinct club, segments 3–13 with rhinaria, segment 3 longer than 4, 5–7 subequal, each slightly shorter than 4, 8–13 each shorter than 5, segment 3 distinctly curved, swollen apically (Fig. 127). Head, viewed frontally, with eyes further apart measured medially than height of an eye, face with long scattered setae, malar space with a distinct epistomal suture, mandibles tridentate. Pronotum either side of pronotal plate sculptured, pronotal plate not projected forward, fovea either side of medial bridge open laterally (Fig. 128). Mesoscutum smooth, polished, notaulices distinct, weakly converging on approach to scutellum, further apart at juncture with scutellum than width of a notauli (Fig. 86); scutellar foveae broader than long, lateral bars polished, scutellar disc visible on lateral margins, reticulate-rugose, apex of disc with long setae, scutellar cup longer than broad, obscuring apex of disc, cup with a large apical depression or fovea, rim of cup with a circle of minute fovea or pits; carinae of propodeum parallel, densely pubescent on outer margins. Mesopleura with a distinct suture, anteroventral cavity of metapleura with a few hairs. Segment 1 of gaster short, wider than long, crenulate, segment 2 the largest in lateral view, apical half densely punctate, segments 3 and 4 partially visible, punctate, hypopygium short, setae present on margins. Legs slender, coxae, femora and tibiae brownish, tarsi yellow, coxae short, swollen, femora swollen on basal half, metatarsus as long as tarsal segments 2–4 combined, tibiae with two apical spines, tarsal claws simple. Wings densely pubescent, apical margins with a hair fringe, radial cell of forewing closed on margin, 3 × as long as broad measured medially, vein 2*rm* almost square. Colour: antenna dark brownish black, head and thorax black, gaster black except for brownish apex.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, viii–xi.1980 (*D. Jackson*) (BMNH).

REMARKS. Distinguished from *nitida* by the antennal ratios and the scutellar cup.

Eucoilidea marcellus sp. n.

(Figs 78, 110, 129, 130)

Description. ♀. Antenna 13-segmented, filiform, segment 3 1·2 × as long as 4, 5–12 each progressively decreasing in length (Fig. 129), 4–13 with rhinaria. Face viewed frontally, smooth, shining, with scattered pubescence, malar space with a distinct suture, mandibles tridentate, maxillary palp 4-segmented, labial palp 2-segmented, eyes elongate, oval, further apart than height of an eye measured medially; pronotal plate not protruding, viewed fronto-dorsally minute, with lateral fovea open either side of medial bridge, pronotum either side of pronotal plate densely pubescent. Mesoscutum smooth, polished, notaulices distinct, converging towards scutellum at a point two-thirds of way towards scutellar suture, not confluent at juncture with scutellum; lateral bars of scutellum polished, scutellar fovea large, deep, scutellar cup large, extending to apex of scutellar disc, convex basally, with a large fovea on apical half with a ring of smaller punctures or fovea around rim of cup, scutellar disc reticulate-rugose, with long setae on apical margins. Propodeal carinae subparallel, converging basally. Mesopleura smooth, polished, carinae complete, metapleura with two ridges, anteroventral cavity with a few hairs, ventral margin of mesopleuron pubescent. Segment 1 of gaster canaliculate, as broad as long, viewed laterally, crescent-shaped (partially obscured by tergite 2), tergite 2 of gaster the largest in lateral view, with a few sparse hairs at base on lateral margins, apical half densely punctate, remaining segments not visible, hypopygium small, ventral spine long. Legs short, robust, yellow, fore and mid coxae with long hair fringe, femora swollen medially, tibiae and tarsi densely pubescent, tarsal claws simple. Wings pubescent on surface, with apical fringe of hairs, radial cell of forewing closed on anterior margin, veins *Rs+M* and *M* distinct, weakly pigmented, radial cell of forewing elongate, 2·6 × as long as broad (Figs 78, 130). Colour: antenna brownish black, head and thorax black, gaster dark brown-black, legs yellowish.

♂. Antenna 15-segmented, filiform, segment 3 the largest, strongly curved, swollen apically (Fig. 110).

MATERIAL EXAMINED

Holotype ♀, **Madagascar**: Tan, Perinet, 27.iv–3.v.1983 (*J. S. Noyes & M. C. Day*) (BMNH).

Paratypes. **Madagascar**: 4 ♀, 4 ♂, same data as holotype. **Mauritius**: 3 ♂ (BMNH). **Zaire**: 1 ♀ (MRAC).

REMARKS. This species is separated from *tyrus* by the shape of the scutellum and the radial cell of the forewing (see key).

Eucoilidea mauri sp. n.

(Figs 131, 132)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, segment 3 1·2 × length of 4, 5–12 each gradually decreasing in length, 13 longer than 12, 5–13 with rhinaria forming a weak club (Fig. 131). Head, viewed frontally, smooth, shining, with sparse pubescence, long setae on anterior tentorial pit, eyes weakly converging, as far apart as height of an eye measured medially, malar suture distinct. Pronotal plate not projected forward, lateral fovea either side of medial bridge open; mesoscutum smooth, polished, notaulices weakly converging towards scutellum, widely spaced at juncture with scutellar suture (Fig. 132); lateral bars of scutellum polished, scutellar foveae large, smooth, shallow, scutellar cup large, oval, with a large medial fovea or depression, scutellar disc viewed dorsally, visible on lateral margins only, reticulate-rugose. Mesopleura smooth, polished, suture distinct, metapleura polished, weakly ridged on margin, anteroventral cavity pubescent; propodeal carinae bowed medially, sparsely pubescent. Segment 1 of gaster partially visible, crenulate, as broad as long, segments 1–3 visible in lateral view, impunctate, tergite 2 the largest, hypopygium not pronounced, ventral spine with long sparse setae. Legs orange-yellow, coxae elongate, swollen basally, trochanters normal, femora short, swollen medially, tibiae normal with two apical spines, metatarsus shorter than tarsal segments 2–5 combined, claws simple. Wing surface pubescent, apical margins with a hair fringe, radial cell of forewing closed on margin, 2·5 × as long as broad measured medially, veins heavily pigmented, vein 2*rm* distinct, in form of a spur, *Rs*+*M* and *M* indicated, weakly pigmented.

Colour: antenna light yellow-brown basally, dark at apex, head and thorax blackish, gaster chestnut-brown.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Mossel Bay, Cape Province, iv.1927 (*R. E. Turner*) (BMNH).

Paratype. 1 ♀, same data as holotype (BMNH).

REMARKS. This species closely resembles *furcula* and could, without close examination, be mistaken for it. The form of the notaulices and the large, almost round cup, distinguish it from related species.

Eucoilidea nitida (Benoit) comb. n.

(Figs 115, 133, 134, 135, 137)

Afrostilba nitida Benoit, 1956: 544. Holotype ♀, ZAIRE (MRAC) [examined].

DESCRIPTION. ♀. Antenna 13-segmented, subclavate, segments 3 and 4 equal in length, 4–13 forming a weak club, each segment slightly shorter and wider in length than preceding one (Fig. 133), apical segment never twice as long as wide. Face, viewed frontally, smooth, shining, malar space with a distinct epistomal suture, eyes diverging at top and bottom, frontal area pronounced, mandibles tridentate. Pronotum either side of pronotal plate smooth, sometimes with weak sculpture on the margins. Pronotal plate not projected forward, lateral fovea either side of medial bridge open laterally, fovea broad, narrow, separated by a narrow bridge medially (Fig. 134). Mesoscutum smooth, polished, notaulices distinct, gradually converging on approach to scutellar suture, almost as far apart at juncture as half width of scutellar cup, scutellar foveae smooth, polished, scutellar disc punctate-reticulate, with scattered hairs, scutellar cup almost oval, with a large apical fovea (Fig. 137), rim of cup with small fovea on lateral margin, apex of disc obscured by cup; carinae of propodeum parallel, pubescent on outer margins. Mesopleura with a distinct suture, metapleura smooth, polished. Segment 1 of gaster short, wider than long, crenulate, segment 2 the largest in lateral view, densely punctured on apical half viewed laterally, remaining segments not visible, hypopygium short. Legs yellow, coxae yellow, meta-tarsus as long as tarsal segments 2–4 combined, tibiae with two apical spurs, tarsal claws simple. Wings pubescent on surface, apical margins with a hair fringe, radial cell of forewing closed on anterior margin, *Rs*+*M* and *M* weakly indicated, radial cell 4 × as long as broad, elongate (Fig. 135), 2*rm* as broad as long. Colour: antenna yellowish black basally, black apically, head and thorax black, gaster dark chestnut-red-brown, legs yellowish.

♂. Antenna 15-segmented, filiform, segment 3 the largest, strongly curved, swollen apically, longer than 4 (Fig. 115).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kivu, Rutshuru, 11.v.1936 (*L. Lippens*) (MRAC).

Paratypes. **Ghana**: 2 ♀, 5 ♂ (BMNH). **Kenya**: 11 ♀, 1 ♂ (BMNH). **South Africa**: 1 ♀ (BMNH). **Zaire**: 27 ♀, 2 ♂ (MRAC). **Zambia**: 3 ♀ (BMNH). **Zimbabwe**: 1 ♀ (BMNH).

REMARKS. A difficult species to separate from *conversa*, but distinguished from it by the overall shape of the antenna and the convergence of the notaulices towards the scutellar suture (Figs 133, 137).

Eucoilidea pallida sp. n.

(Figs 83, 93, 112, 117, 141)

DESCRIPTION. ♀. Antenna 13-segmented, subclavate, pale yellow, segments 9–13 forming a weak club. Face, viewed frontally, smooth, polished, frontal area raised, face with long scattered pubescence, malar space with a distinct carina, mandibles tridentate, eyes further apart than height of an eye measured medially, diverging at top and bottom (*cf.* Fig. 117). Pronotum either side of pronotal plate crenulate-foveolate (*cf.* Fig. 83), pronotal plate not protruding, lateral fovea either side open laterally. Mesoscutum smooth, shining, the juncture with pronotum weakly channelled, notaulices distinct, converging sharply towards scutellum at a point two-thirds distance from scutellar suture (Figs 93, 141), scutellar disc transversely strigose, visible on lateral margins, viewed dorsally, apex sometimes obscured by scutellar cup, scutellar cup elongate, with a large apical depression, rim of cup with a ring of smaller fovea or pits. Mesopleura with a distinct suture, carinae of propodeum parallel. Segment 1 of gaster short, as broad as long, crenulate, segment 2 the largest, obscuring in lateral view remaining tergites of gaster, impunctate, hypopygium hardly visible, ovipositor protruding. Legs orange-yellow, tibiae with two apical spines, claws simple. Wings pubescent on surface, apical margins with a distinct hair fringe, radial cell of forewing closed on margin but very weakly pigmented on anterior margin (*cf.* Fig. 112), at least twice as long as wide, *Rs+M* and *M* indicated but not pigmented, 2*rm* distinct. Colour: antenna pale yellow, head and thorax black, gaster chestnut-red-black.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Mossel Bay, Cape Province, 5–31.vii.1921 (*R. E. Turner*) (BMNH).
Paratypes. **South Africa**: 10 ♀ (BMNH). **Southern Yemen:** 1 ♀ (BMNH). **Zaire**: 2 ♀ (MRAC).

REMARKS. This species is close to *fetura* but can be separated by the very distinctive, bright yellow antenna and the large scutellar cup. It is far more robust than *fetura*. A male from Zambia (BMNH) could be this species, but without an associated female I am reluctant to treat it as such.

Eucoilidea parma sp. n.

(Figs 88, 138, 139, 140)

DESCRIPTION. ♀. Antenna 13-segmented, subclavate, segments 3 and 4 subequal in length, segments 6–13 forming a weak club, all with rhinaria, each segment longer than broad, slightly wider apically than at base (Figs 88, 138). Face, viewed frontally, smooth, shining, malar space with epistomal suture, mandibles tridentate. Pronotum with pubescence either side of pronotal plate, surface aciculate. Pronotal plate very weakly produced, foveae either side open on lateral margins. Mesoscutum smooth, polished, notaulices distinct, converging sharply at a point one-quarter from scutellar suture, not confluent (Fig. 139), scutellar foveae deep basally, scutellar disc punctate-reticulate, with long scattered hairs, scutellar disc visible laterally and apically, not obscured by scutellar cup; carinae of propodeum parallel, pubescent on either side. Mesopleura with a distinct carina. Segment 1 of gaster short, wider than long, crenulate, segment 2 the largest in lateral view, densely punctured on apical third, segment 3 partially visible in lateral view, hypopygium short. Legs yellow, coxae orange-yellow, metatarsus as long as tarsal segments 2–4 combined, tibiae with 2 apical spurs, tarsal claws simple. Wings ciliate or pubescent on surface, with apical hair fringe on margins, radial cell of forewing closed on anterior margin, *Rs+M* and *M* not indicated, radial cell 3 × as long as wide, elongate (Fig. 140), vein 2*rm* longer than broad. Colour: antenna yellowish without darkened apical segments, head and thorax black, gaster chestnut-red.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Nigeria**: Ile-Ife, W. State, vi.1973 (*J. T. Medler*) (BMNH).
Paratypes. **Nigeria**: 2 ♀ (BMNH). **Madagascar**: 1 ♀ (BMNH). **Zaire**: 4 ♀ (MRAC).

REMARKS. Similar to *conversa* but distinguished by the subclavate antenna.

Eucoilidea perangusta sp. n.

(Figs 95, 96, 137, 143)

DESCRIPTION. ♀. Antenna 13-segmented, weakly subclavate, segment 3 very slightly shorter than 4, 6–13 forming a very weak club, all with rhinaria (Fig. 96). Face, viewed frontally, smooth, shining, malar space with a distinct epistomal suture, eyes diverging at top and bottom, frontal area pronounced, mandibles tridentate. Pronotal plate weakly protruding viewed dorsally, lateral fovea open, wide and narrow, pronotum either side of plate with long scattered pubescence, surface with widely spaced aciculate sculpture. Mesoscutum smooth, polished, juncture with pronotum on lateral margins crimped, notaulices distinct, converging gently towards scutellum (*cf.* Fig. 137), scutellar fovea shallow, scutellar disc coriaceous, cup oval with a large central fovea, outer margins of cup without a ring of smaller fovea: propodeal carinae parallel. Mesopleura smooth, polished, with distinct suture. Segment 1 of gaster short, broader than long, crenulate, segment 2 the largest in lateral view, remaining segments not visible, hypopygium short, not protruding. Legs deep yellow, meta-tarsus shorter than tarsal segments 2–4 combined, tibiae with two apical spines, tarsal claws simple. Wings pubescent on surface, apical margins with a hair fringe, radial cell of forewing closed on anterior margin, elongate, 3·6 × as long as wide, *Rs+M* and *M* weakly pigmented, 2*rm* broader than long (Fig. 95). Colour: antenna pale basally, apical 7 segments dark brown, head and thorax black, gaster orange-yellow in ♀, brownish in ♂.

♂. Antenna filiform, 3rd segment curved, swollen distally (Fig. 143).

MATERIAL EXAMINED

Holotype ♀, **Zambia**: 15 km E. Lusaka, 13–22.xi.1979 (*R. A. Beaver*) (BMNH).

Paratypes. **Zimbabwe**: 1 ♀ (BMNH). **Zaire**: 1 ♀ (MRAC). **Zambia**: 2 ♀, 4 ♂ (BMNH).

Eucoilidea trulla sp. n.

(Figs 79, 85, 107, 145, 147)

DESCRIPTION. ♀. Antenna 13-segmented, subclavate, segment 3 larger than 4, shorter than 4+5, 4 and 5 subequal, 5–12 gradually decreasing in length (Fig. 79). Head, viewed frontally, smooth, shining, frontal line (frons) convex, malar space with epistomal suture distinct, mandibles tridentate, cheeks sharply converging. Pronotal plate not projecting, lateral fovea open on margin, sparsely pubescent on outer margins. Mesoscutum with notaulices distinct, converging two-thirds of way towards scutellum but not confluent, scutellar disc punctate-rugose, clearly visible laterally and apically (*cf.* Fig. 85), scutellar cup large with a fovea basally, with traces of small punctures around rim, scutellar fovea large, polished. Mesopleura smooth, polished, suture distinct; carinae of propodeum parallel. Segment 1 of gaster short, wider than long, crenulate, segment 2 the largest in lateral view, impunctate, segments 3 and 4 punctate, hypopygium short with long basal setae, ovipositor sheath short (Fig. 145). Legs yellow-orange, tibiae with 2 apical spurs, claws simple. Wings pubescent on surface, with apical fringe of hairs, radial cell of forewing closed on margin, elongate, *Rs+M* and *M* indicated, not pigmented (Fig. 147). Colour: antenna black, head and thorax black, gaster black dorsally, chestnut-red ventrally.

♂. Antenna 15-segmented moniliform, 3rd segment the largest, weakly curved (Fig. 107).

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Natal, nr Pietermaritzburg, 21.iii.1980 (*P. Joubert*) (BMNH).

Paratypes. **South Africa**: 1 ♀, 2 ♂, same data as holotype (BMNH). **Zaire**: 12 ♀, 6 ♂ (MRAC).

REMARKS. Closely related to a group of species in which the third antennal segment of the ♀ is clearly longer than the 4th, and the gaster is finely punctate.

Eucoilidea tyrus sp. n.

(Figs 80, 148)

DESCRIPTION. ♀. Antenna 13-segmented, filiform, segment 3 weakly curved, 1·2 × length of 4, 4–13 with rhinaria, 4–6 subequal in length, 7–13 each progressively shorter than the preceding segment. Head, viewed frontally, smooth, shining, eyes further apart measured medially than height of an eye, weakly converging, face with scattered setae, mandibles tridentate, basal tooth blunt, malar suture distinct. Pronotum either side of pronotal plate smooth with scattered pubescence, pronotal plate not conspicuously produced forward, medial bridge narrow, fovea on lateral margins open (Fig. 148). Mesoscutum smooth, polished, with scattered hairs, notaulices complete, converging towards scutellum, further apart at juncture with scutellum than width of one notauli, scutellar cup slightly longer than broad, apical half with a large fovea, rim of cup with a number of minute fovea around edge, scutellar disc reticulate-rugose, visible in lateral and apical view. Mesopleura smooth, shining, suture distinct, metapleura ridged on upper part, anteroventral cavity with a few sparse hairs; propodeal carinae parallel, densely pubescent on lateral margins. Segment 1 of gaster crenulate, short, wider than long, segment 2 the largest in lateral view, apical half finely punctate, visible part of segment 3 finely punctate, hypopygium pronounced, broad with long basal setae, ventral spine produced past apex of gaster. Legs bright yellow, coxae short, broad, all femora swollen medially, tibiae with two apical spurs, slender, as long as tarsi. Wing surface pubescent, apical margins with a hair fringe, radial cell of forewing closed on margin, 3·6 × as long as broad measured medially (Fig. 80), *Rs+M* and *M* indicated by weak pigmentation, base of wing not fumate. Colour: antenna yellow basally, apical segments darker, head and thorax blackish brown, gaster brownish, legs bright orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, x–xi.1980 (*D. Jackson*) (BMNH).

REMARKS. Closely related to *marcellus* but separated by the gaster and the form of the scutellum.

Eucoilidea urundiensis Benoit

(Figs 98, 99, 100, 139)

Eucoilidea urundiensis Benoit, 1956: 548. Holotype ♀, Zaire (MRAC) [examined].

Description. ♀. Antenna 13-segmented, subclavate, segment 3 longer than 4, 5 shorter than 4, 5–13 with rhinaria, forming a weak club (Fig. 98). Face, viewed frontally, smooth, shining, with long scattered pubescence, malar space with epistomal suture, eyes slightly further apart than height of an eye measured medially, weakly converging, mandibles tridentate. Pronotal plate not produced forward, foveae either side of medial bridge open. Pronotum either side of plate with sparse scattered hairs on an aciculate surface. Mesoscutum smooth, polished, notaulices distinct, converging sharply towards scutellar suture two-thirds from scutellar suture, scutellar fovea large, smooth, polished, scutellar cup large, almost round, with a large central fovea, rim of cup with a few fovea around edges, scutellar disc rounded apically, surface reticulate-rugose (*cf.* Fig. 139) with scattered hairs on apical margin; carinae of propodeum diverging at base, with dense pubescence on either side; mesopleural suture distinct, metapleura smooth. Segment 1 of gaster wider than long, short, crenulate, segment 2 the largest in lateral view, segments 3 and 4 partially visible, finely punctate (Fig. 100), hypopygium with basal hairs. Legs orange, with moderately dense pubescence, hind meta-tarsus as long as tarsal segments 2–4 combined, tibia with two apical spines, tarsal claws simple. Wings pubescent on surface, apical margins with a hair fringe, radial cell of forewing closed, 2 × as long as wide, $Rs+M$ and M absent, $2rm$ longer than wide. Colour: antenna yellowish with dark apices, head and thorax blackish, gaster chestnut-brown.

♂. Antenna 15-segmented, segment 3 longer than 4, curved, flattened on outer margins (Fig. 99).

Material examined

Zaire: 1 ♀ (holotype), Urundi (Mosso), Makoronkwe, 1450 m, 12.iii.1953 (*P. Basilewsky*) (MRAC).
Uganda: 1 ♂ (BMNH). **Zaire**: 12 ♀ (MRAC). **Zimbabwe**: 1 ♀ (BMNH). (All paratypes.)

HEXACOLA Foerster

Hexacola Foerster, 1869: 342. Type-species: *Eucoela picicrus* Giraud, by monotypy.
Hexaplasta Foerster, 1869: 345. Type-species: *Cothonaspis hexatoma* Hartig, 1841: 357, by original designation. [Synonymy by Rohwer & Fagan, 1917.]

Diagnosis. ♀ antenna generally 13-segmented but in some species 11–12 segmented, clavate, ♂ antenna 15-segmented, segment 3 curved, longer than 4th (Fig. 39); wings pubescent, ciliate, radial cell of forewing open on front margin (vein R_1 projecting slightly on margin but not joining Rs_2), $Rs+M$ and M (cubitus) indicated; scutellar cup elliptical, not extending to apex of disc, scutellar disc striate on lateral margins.

Discussion. Closely related to *Kleidotoma* but distinguished by the shape of the radial cell of the forewing and the absence of an incision on the apical margin of the wing. In *Hexacola* the apex of the forewing is normally rounded, neither truncate nor incised. The scutellar disc is not as distinctly striated as in *Kleidotoma* and the wings are generally narrow.

Distribution. Europe; South Africa; North and South America.

Biology. The type-species of *Hexaplasta* is a known parasite of *Oscinella frit* (L), the frit fly (Imms, 1930; Kerrich & Quinlan, 1960).

Remarks. Nordlander (1981) notes that some earlier authors considered that the nominal species designated by Foerster as type-species of *Hexacola* was misidentified and that in fact the species was *Kleidotoma hexatoma* Thomson, 1862 (Kieffer, 1901, 1902; Ashmead, 1903; Dalla Torre & Kieffer, 1910). Ashmead (1903) also designated *K. hexatoma* Thomson as type-species of *Hexacola*. Rohwer & Fagan (1917) concluded that *Eucoela picicrus* Giraud, 1860 is the type-species of *Hexacola* by original designation and monotypy. They made *Hexaplasta* Foerster a junior synonym of *Hexacola*, thereby acting as first revisers. Nordlander (1981) is submitting a case to the International Commission on Zoological Nomenclature to decide on the type-species designation, and states that he has compared a female in the Foerster collection, labelled 'Hexacola picicrus Giraud', with syntypes of *Kleidotoma hexatoma* Thomson, and considers them to be conspecific.

Key to the Afrotropical species of *Hexacola* Foerster

Females

1 Antenna of ♀ 11–12 segmented, club 5–6 segmented, segment 3 as long as 4+5 2

– Antenna of ♀ 13-segmented, club 4–8 segmented ... 5

2 Antenna of ♀ 11-segmented, club 5-segmented, sharply defined, together distinctly longer than flagellar segments 1–6, 4–6 quadrate (Fig. 149) ... ***absensa*** sp. n. (p. 273)
– Antenna of ♀ 12-segmented, club 5–6 segmented, flagellar segments longer than broad ... 3

3 Antennal club 5-segmented, as long as combined lengths of flagellar segments 1–7, segments 4–7 each slightly longer than wide (Fig. 150); mesopleural suture absent ... ***pallida*** sp. n. (p. 277)
– Antennal club 6-segmented, much longer than combined lengths of flagellar segments 1–6, segments 4–6 as wide as long or longer than wide (Figs 151, 152); mesopleural suture complete ... 4

4 Antennal segments 4–6 longer than wide (Fig. 151) ... ***atropos*** sp. n. (p. 274)
– Antennal segments 4–6 as wide as long (Fig. 152) ... ***zama*** sp. n. (p. 279)

5 Antennal club 4–5 segmented ... 6
– Antennal club with 6 or more segments ... 8

6 Antennal club 4-segmented (Fig. 153) ... ***fringa*** sp. n. (p. 276)
– Antennal club 5-segmented (Figs 154, 155) ... 7

7 Club segments together slightly shorter than flagellar segments 1–8, 4–8 longer than broad (Fig. 154) ... ***quisnama*** sp. n. (p. 278)
– Club segments together much longer than flagellar segments 1–8, as broad or broader than long (Fig. 155) ... ***quinqueclavata*** sp. n. (p. 278)

8 Antennal club 6–7 segmented (Figs 157, 60) ... 9
– Antennal club 8-segmented (Fig. 156).
Segment 3 as long as 4+5, apex of tergite 2 of gaster and tergites 3–5 completely punctate ***octoclava*** sp. n. (p. 277)

9 Antennal club 6-segmented (Figs 157, 158) ... 10
– Antennal club 7-segmented (Fig. 160) ... 12

10 Antennal club sharply defined (Fig. 158), segments 4–7 of flagellum as wide as long, apex of tergite 2 and segments 3 and 4, when visible, punctate ... 11
– Antennal club not sharply defined, segments 4–7 of flagellum longer than wide, not compacted (Fig. 157); gaster impunctate ... ***hexatoma*** (Hartig) (p. 276)

11 Flagellar segments 4–7 of antenna wider than long, compacted, club segments together much longer than segments 1–7 combined (Fig. 158) ... ***compacta*** sp. n. (p. 275)
– Flagellar segments 4–7 of antenna as wide as long, not compacted, club segments together as long as segments 1–7 (Fig. 159).
Bicoloured; legs bright yellow; gaster punctate ... ***bifaria*** sp. n. (p. 275)

12 Antennal club sharply defined (Fig. 160) ... ***septemius*** sp. n. (p. 279)
– Antennal club not sharply defined (Fig. 161).
Segments 1–7 of flagellum bright yellow, segments 8–13 blackish brown, gaster impunctate ... ***amantia*** sp. n. (p. 274)

Males

1 Vertex of head striate; segment 3 of antenna the longest, strongly swollen distally, outer margins flattened medially (Fig. 39); radial cell of forewing 2·5 × as long as wide, vein Rs_2 not extended along wing margin ... ***hexatoma*** Hartig (p. 276)
– Vertex of head smooth, polished; segment 3 of antenna the longest, curved, weakly, swollen apically (Fig. 170); radial cell of forewing long and narrow, 3·5–4·0 × as long as broad, Rs_2 sometimes extended along wing margin ... 2

2 Apex of tergite 2 of gaster and following segments punctate; radial cell almost as wide as long (1·25 × as long as wide), Rs_2 weakly extending along wing margin ... ***octoclava*** sp. n. (p. 277)
– Gaster impunctate; radial cell elongate, Rs_2 extended along wing margin
bifaria- and ***quinqueclavata***-groups

Hexacola absensa sp. n.

(Figs 40, 149, 168)

Description. ♀. Antenna 11-segmented, with sharply defined 5-segmented club, the club longer than flagellar segments 1–6, 4–6 quadrate (Fig. 149). Head, viewed frontally, a little longer than broad, smooth, shining, eyes almost round, further apart measured medially than height of an eye, malar groove distinct. Pronotal plate projected forward, anterior and posterior parts joined by narrow medial bridge, fovea on either side open on lateral margins (Fig. 40); pronotum either side of pronotal plate with a tuft of pubescence. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum polished with a few striations apically; scutellar foveae wider than long, angular, scutellar cup long, narrow, polished, weakly excavate, not extending to apex of disc (*cf.* Fig. 168), scutellar disc with broken longitudinal striations laterally, apex rounded; propodeal carinae obscured by pubescence. Mesopleura smooth, polished, suture complete [metapleura not entire due to pin on which the specimen is mounted]. Segment 1 of gaster obscured by a ring of pubescence at base of tergite 2, not complete on dorsal surface, tergites 3 and 4 visible in lateral view, punctate, hypopygium not prominent. Wings short, broad, surface pubescent, apical hair fringe sparse, radial cell of forewing partially open on wing margin but appears closed due to pigmentation, vein R_1 not complete, apex of wing rounded. Legs short, robust, mid and hind coxae thick, femora swollen medially, tibiae broad apically, tarsi slender. Colour: club segments of antenna brownish, flagellar segments orange-brown, head, thorax and gaster dark brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Uele, Buta, 450 m, 11.iv.1935 (*G. F. de Witte*) (MRAC).

REMARKS. Distinguished primarily from all other species in the genus by the 11-segmented antenna.

Hexacola amantia sp. n.

(Figs 161, 162, 163, 167)

DESCRIPTION. ♀. Antenna 13-segmented with a weakly defined, 7-segmented club, flagellar segments 3–6 each longer than wide, 3 longer than 4 (Fig. 161). Head, viewed frontally, smooth, polished, with scattered hairs, eyes oval, further apart measured medially than height of an eye, malar grooves distinct, mandibles with scattered setae extending to supraclypeal area, anterior tentorial pits distinct, epistomal suture present. Pronotal plate projected forward, anterior and posterior parts connected by a broad medial bridge, lateral fovea either side of bridge open (Fig. 162). Pronotum either side of plate with a tuft of hairs. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum smooth, polished, scutellar fovea narrow, angularly opposed to each other, smooth, polished, scutellar cup oval-elongate, lateral margins of scutellar disc narrow, weakly striated (almost smooth in some specimens), apex of disc reticulate-rugose, rounded (*cf.* Fig. 167), propodeal carinae subparallel, weakly bowed posteriorly at juncture with nucha, lateral margins of propodeum densely pubescent. Mesopleura and metapleura smooth, polished, metapleura with traces of ridges, mesopleural carina complete. Segment 1 of gaster obscured by a dense ring of hairs at base of tergite 2, complete on dorsal surface, tergite 2 occupying whole of visible surface in lateral view, smooth, impunctate, hypopygium weakly protruding, ventral spine not visible. Wing surface pubescent, apical margins rounded, with a long hair fringe, radial cell of forewing open on margin, vein R_1 partially projected along margin. Legs normal, mid and hind coxae robust, 2 × as long as broad, swollen basally, trochanters longer than broad, fore and mid femora longer than fore and mid tibiae, hind femora shorter than hind tibia, fore and mid-tibiae longer than fore and mid-tarsi, hind tibiae and tarsi subequal in length. Colour: antennal segments 1–7 orange-yellow, 8–13 dark brown, head, thorax and gaster blackish brown, legs yellow.

♂. Antenna 15-segmented, filiform, segment 3 the largest, strongly curved, surface flattened on outer margin (Fig. 163).

MATERIAL EXAMINED

Holotype ♀, **Nigeria**: Samaru, em. 30.viii.1968, ex Oscinellinae pupa on *Scoliophthalmus micantipennis* Duda (guinea corn shoot) (J. C. Deeming) (BMNH).

Paratypes. **Nigeria**: 5 ♀, 3 ♂ (BMNH). **Uganda**: 1 ♀ (BMNH). **Zaire**: 7 ♀, 2 ♂ (MRAC).

REMARKS. Closely related to *septemius* but distinguished by the antennal shape (Fig. 161).

Hexacola atropos sp. n.

(Figs 151, 164)

DESCRIPTION. ♀. Antenna 13-segmented with a sharply defined 6-segmented club (Fig. 151), the club much longer than flagellar segments 1–6, flagellar segments longer than wide. Head, viewed frontally, almost rounded, eyes slightly further apart than height of an eye measured medially, face smooth, polished, with a few scattered setae, malar groove distinct, vertex polished. Pronotal plate projected forward, anterior and posterior parts joined by a narrow medial bridge, fovea either side open laterally; pronotum either side of pronotal plate with a few long setae. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum smooth, polished, scutellar foveae small, wider than long, polished, scutellar cup long, narrow, with a small apical fovea, scutellar disc longitudinally striate on lateral margins, apex rounded with a few long setae; propodeal carinae weakly bowed, sides of propodeum densely pubescent. Mesopleura and metapleura smooth, polished, mesopleural carinae distinct. Segment 1 of gaster completely obscured by dense wool-like ring of pubescence at base of tergite 2, complete on dorsal surface, tergite 2 the largest in lateral view, tergites 3 and 4 partially visible, punctate, hypopygium short, broad, ventral spine short. Wing surface densely pubescent, apical hair fringe long, radial cell of forewing partially closed on wing margin, apex of wing rounded (Fig. 164). Legs normal, mid and hind coxae swollen, femora swollen basally, tibiae broad apically, tarsi longer than tibiae. Colour: antenna orange-brown, basal segments lighter, head brownish, thorax orange-yellow, gaster brownish, legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, i–ii.1980 (*D. Jackson*) (BMNH).
Paratypes. **Cameroun**: 1 ♀ (BMNH). **Zaire**: 1 ♀ (MRAC).

REMARKS. Distinguished from *zama* by the antenna (Fig. 151).

Hexacola bifaria sp. n.

(Figs 159, 165)

DESCRIPTION. ♀. Antenna 13-segmented with distinct 6-segmented club, together longer than flagellar segments 1–7, segments 4–7 each as broad as long (Fig. 159). Head, viewed frontally, smooth, polished, with a few hairs medially, anterior tentorial pits prominent, epistomal suture distinct, malar grooves complete, cheeks weakly converging, eyes almost round, further apart measured medially than height of an eye, mandibles bright yellow. Pronotal plate viewed dorsally, projected forward, anterior and posterior parts connected medially by a broad bridge, fovea on each side open laterally, pronotum either side of pronotal plate with a tuft of pubescence. Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum smooth, polished, scutellar foveae shallow, polished, as wide as long, scutellar cup narrow, elliptical, scutellar disc striate on lateral margins, apex rounded with weak radiating striae; carinae of propodeum subparallel, converging towards nucha, lateral margins of propodeum densely pubescent, meso- and metapleura smooth, polished, mesopleural carinae complete, metapleura with one or two ridges in upper region. Segment 1 of gaster obscured by ring of dense pubescence at base of tergite 2, complete on dorsal surface, tergites 2–4 visible in lateral view, apex of tergite 2 and visible parts of 3 and 4 punctate, tergite 2 the largest in lateral view, hypopygium short, broad, ventral spine as long as hypopygium. Wing surface pubescent, apical margins rounded, with a hair fringe, radial cell of forewing open on wing margin, vein R_1 partially extended along margin. Legs normal, coxa a little longer than wide, swollen medially, trochanters as long as wide, front femora swollen medially, longer than tibiae, mid femora and tibiae subequal in length, femora with usual medial swelling, hind femora shorter than hind tibiae, swollen basally. Colour: club segments of antenna darker than basal flagellar segments, head, thorax and gaster dark chestnut-brown, legs pale yellow.

♂. Antenna 15-segmented, filiform, segment 3 the largest, bent or angled at base, the outer side flattened (Fig. 165).

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, i.1979 (*A. Watsham*) (BMNH).
Paratypes. **Nigeria**: 1 ♀ (BMNH). **Zaire**: 17 ♀, 2 ♂ (MRAC); 3 ♀ (BMNH).

REMARKS. Closely similar to *compacta* but distinguished by the form of the antenna.

Hexacola compacta sp. n.

(Figs 158, 166)

DESCRIPTION. ♀. Antenna 13-segmented, with sharply defined 6-segmented club, the club 2 × as long as flagellar segments 1–7, segment 3 subequal in length to 4+5, segments 4–7 each broader than long, segment 1 of club (8th flagellar segment) as long as segments 4–7 combined and much wider (Fig. 158). Head, viewed frontally, smooth, shining, with scattered hairs in supraclypeal area and on mandibles, eyes semi-circular, further apart measured medially than height of an eye, anterior tentorial pits distinct, malar groove percurrent, cheeks converging, vertex polished. Pronotal plate projected forward, anterior and posterior parts connected medially by a narrow bridge, fovea on either side open laterally (Fig. 166). Pronotum on lateral margins of plate with tufts of pubescence. Mesoscutum smooth, polished, with trace of notaulices, lateral bars of scutellum smooth, polished, scutellar foveae as wide as deep, polished, scutellar cup longer than broad, outer rim paler than middle, apex of cup with lateral fovea, scutellar disc reticulate-rugose, not striated, apex rounded. Meso- and metapleura smooth, polished, mesopleural carinae complete, metapleura without ridges. Propodeal carinae parallel, lateral margins of propodeum pubescent. Segment 1 of gaster obscured by a dense ring of pubescence at base of tergite 2, complete on dorsal surface, tergites 2–3 visible in lateral view, tergite 2 the largest in lateral view, visible part of tergite 3 punctate, hypopygium small, ventral spine weakly produced. Wing surface pubescent, apex of wing broad with apical hair fringe, radial cell of forewing partially open on wing margin, i.e. vein R_1 weakly produced along margin, not closing cell. Legs short, robust, hind coxa 2 × as long as wide, swollen basally, trochanters longer than broad, femora swollen basally, shorter than tibiae, tibiae long, narrow basally, wide apically, tibiae and tarsi subequal in length. Colour: antenna dark brown, head brownish, gaster and thorax chestnut-brown, legs yellow-orange.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: 25.viii.1951 (*J. Verschuren*) (MRAC).

Paratypes. **Zaire**: 2 ♀ (MRAC).

REMARKS. Distinguished from other closely related species by the bright yellow legs.

Hexacola fringa sp. n.

(Figs 153, 164, 167)

DESCRIPTION. ♀. Antenna 13-segmented with weakly defined, 4-segmented club, the total length of club less than combined lengths of flagellar segments 1–9 which are each longer than broad (Fig. 153). Head, viewed frontally, as broad as long, eyes round, weakly converging towards clypeus, further apart measured medially than height of an eye, face smooth, polished, with a few sparse hairs. Pronotal plate projected forward, anterior and posterior parts joined by a medial bridge, fovea on either side open laterally, pronotum on either side of pronotal plate with a tuft of pubescence. Mesoscutum smooth, polished, notaulices absent, in their place a row of hair bases, lateral bars of scutellum short, broad basally, polished, scutellar foveae small, almost round, scutellar cup long, narrow, not well defined, scutellar disc with aberrant sculpture, apex rounded (Fig. 167); propodeal carinae parallel, weakly converging basally, sides of propodeum densely pubescent. Mesopleura and metapleura smooth, polished, mesopleural carinae complete, metapleura ridged near posterior margin. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2 which is complete on dorsal surface, tergites 3–4 visible in lateral view, impunctate, tergite 2 the largest visible tergite, hypopygium not pronounced. Wings densely pubescent, apical fringe long, wing margin at apex not sharply rounded, radial cell of forewing open on wing margin, vein R_1 weakly projected along margin (*cf.* Fig. 164). Legs with mid and hind coxae short, front femora the largest, swollen, mid and hind femora short, swollen, tibiae short, broad apically, front tarsi longer than front tibiae, mid and hind tibiae subequal in length to their tarsi. Colour: antenna yellow basally, club segments darker, head dark brown, thorax and gaster dark chestnut-brown, legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, i.1979 (*A. Watsham*) (BMNH).

Paratypes. **Zimbabwe**: 3 ♀, same data as holotype (BMNH).

REMARKS. Separated primarily from *quisnama* by the antennal structure (Fig. 153).

Hexacola hexatoma (Hartig)

(Figs 157, 168, 169)

Cothonaspis hexatoma Hartig, 1841: 357. Lectotype ♀. GERMANY, designated by Quinlan *in* Kerrich & Quinlan, 1960: 191 [examined].

DESCRIPTION. ♀. Antenna 13-segmented, subclavate, with weakly defined 6-segmented club, flagellar segments 1–7 each longer than broad (Fig. 157). Head, viewed frontally, smooth, polished, with a few scattered hairs, particularly in region of mandibles, anterior tentorial pits indicated, malar grooves complete, eyes further apart measured medially than height of an eye, cheeks weakly converging, vertex strigose. Pronotal plate projected forward, anterior and posterior parts connected by a medial bridge, fovea on either side of pronotal plate open laterally. Pronotum either side of pronotal plate with a tuft of pubescence. Mesoscutum smooth, polished, with scattered setae, notaulices absent, lateral bars of scutellum polished, scutellar cup narrow, elliptical with a fovea on apical half, scutellar disc with fine aberrant striate sculpture (Fig. 168), scutellar fovea polished, wide, narrow, apex of scutellar disc rounded. Mesopleura and metapleura polished, mesopleural carina complete, lateral margins of pronotum densely pubescent, propodeal carinae subparallel. Segment 1 of gaster obscured by dense ring of pubescence at base of tergite 2, complete on dorsal surface, tergites 2–4 visible in lateral view, impunctate, tergite 2 the largest, hypopygium broad. Wing surface pubescent with apical fringe of hairs, radial cell of forewing open on wing margin, vein R_1 partially projected along wing margin. Legs long, slender, mid and hind coxae pubescent. Colour: antenna, head, thorax and gaster brownish black.

♂. Antenna 15-segmented, filiform, segment 3 curved, swollen at apex, flattened on outer margin (Fig. 169).

MATERIAL EXAMINED

Lectotype ♀, **Germany**.
England: 30 ♀, 28 ♂ (BMNH). **Uganda**: 1 ♀, 1 ♂ (BMNH).

REMARKS. Similar to *compacta* and *bifaria* but separated initially by the antennal club and the ratio of the basal flagellar segments, and by the impunctate gaster.

Hexacola octoclava sp. n.

(Figs 156, 170)

DESCRIPTION. ♀. Antenna 13-segmented with a sharply defined 8-segmented club, much longer than flagellar segments 1–5 combined, segment 3 as long as 4+5 (Fig. 156). Face, viewed frontally, wider than long, eyes converging, slightly further apart than height of an eye measured medially, face smooth, polished, with sparse setae in supraclypeal area and on mandibles, malar grooves distinct. Pronotal plate distinct, projected forward, anterior and posterior parts connected by a medial bridge, fovea on either side open on lateral margins; pronotum either side of pronotal plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum polished, scutellar foveae kidney-shaped, scutellar cup narrow, elliptical, not extending to apex of scutellar disc, lateral margins of disc with broken striate sculpture laterally, reticulate-rugose basally; propodeal carinae subparallel, lateral margins pubescent. Mesopleural suture complete, metapleura smooth, polished. Segment 1 of gaster obscured by a dense ring of pubescence at base of tergite 2. Tergites 2–5 visible in lateral view, tergite 2 the largest, apex of tergite 2 and visible parts of 3–5 densely punctate, hypopygium slender, ventral spine protruding. Wing surface pubescent, apical margins rounded, with a fringe of hairs, radial cell of forewing open on margin, vein R_1 partially extended along margin of wing. Legs slender, mid and hind coxae elongate, swollen medially, trochanters longer than wide, femora short and swollen, tibiae and tarsi long, slender, subequal in length. Colour: antenna brownish apically, basal segments lighter, head, thorax and gaster dark chestnut-brown, legs yellow.

♂. Antenna 15-segmented, segment 3 curved, swollen apically, flattened on outer margin (Fig. 170).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: 18.ix.1952 (*H. de Saeger*) (MRAC).
Paratypes. **Zaire**: 3 ♀, 3 ♂ (MRAC).

REMARKS. This species is distinguished from all others described here by the 8-segmented club of the antenna.

Hexacola pallida sp. n.

(Figs 148, 150, 177)

DESCRIPTION. ♀. Antenna 13-segmented, with a sharply defined 5-segmented club, the combined lengths of club segments little longer than flagellar segments 1–7 (Fig. 150). Head, viewed frontally, almost spherical, eyes rounded, further apart measured medially than height of an eye, face smooth, polished, with a few scattered setae, malar groove distinct. Pronotal plate projected forwards, anterior and posterior parts connected by a narrow medial bridge, foveae opon on lateral margins (*cf.* Fig. 148); pronotum either side of plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum short, broad basally, polished, smooth, scutellar foveae shallow, polished, as wide as long, scutellar disc rounded apically, surface with aberrant longitudinal striate sculpture, scutellar cup long, narrow, not extending to apex of disc; propodeal carinae weakly converging towards apex, densely pubescent on lateral margins. Mesopleural suture absent, metapleura smooth, polished. Segment 1 of gaster completely obscured by a ring of dense pubescence at base of tergite 2, sparse on dorsal surface, tergite 3 visible in lateral view, impunctate, hypopygium short, broad. Wings long, narrow, surface pubescent, with long apical hair fringe (Fig. 171), radial cell open on margin, apex of wing not acutely rounded. Legs short, robust, tarsi narrow, longer than tibiae. Colour: antenna yellowish, head, thorax, and gaster orange-yellow, legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Eala, ix.1935 (*J. Ghequière*) (MRAC).

Paratypes. **Zaire**: 2 ♀, same data as holotype (MRAC).

REMARKS. This species is distinguished from others by the absence of a mesopleural suture, the narrow wings and the shape of the radial cell (Fig. 171).

Hexacola quinqueclavata sp. n.

(Fig. 155)

DESCRIPTION. ♀. Antenna 13-segmented with sharply defined 5-segmented club 1·3 × length of flagellar segments 1–8, segment 3 subequal in length to 4+5, segments 4–8 as broad as long (Fig. 155). Face, viewed frontally, very slightly longer than wide, eyes almost circular, further apart measured medially than height of an eye, face smooth, polished, with a few sparse hairs, clypeus with sparse hairs, malar groove distinct. Pronotal plate projected forward, anterior and posterior parts connected medially by a bridge, fovea either side open laterally; pronotum either side of plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum smooth, polished, short, broad basally, scutellar foveae wider than long, polished, scutellar disc with weak broken longitudinal striations, apex weakly conical, reticulate-rugose, scutellar cup small, longer than wide, not extending to apex of scutellar disc; propodeal carinae bowed medially, lateral margins of propodeum densely pubescent, mesopleura smooth, polished, metapleura pubescent on ventral margin, mesopleural suture complete. Segment 1 of gaster obscured by a dense ring of pubescence at base of tergite 2, complete on dorsal surface, gaster impunctate, hypopygium not projecting. Wing surface pubescent, with apical hair fringe, apex of wing broad, rounded, radial cell of forewing open on margin, vein R_1 weakly extending along margin. Legs of normal proportions, mid and hind coxae swollen, longer than broad, femora short, swollen, slightly shorter than tibiae, tarsi a little longer than tibiae. Colour: antenna yellowish basally, club segments darker, head, thorax and gaster dark brownish to chestnut-red, legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, xii.1978 (*A. Watsham*) (BMNH).

Paratypes. **Cameroun**: 3 ♀ (BMNH). **Madagascar**: 3 ♀ (BMNH). **Nigeria**: 1 ♀ (BMNH). **Zaire**: 14 ♀ (MRAC).

REMARKS. This species is close to *quisnama* but can be separated by the antenna, the club segments being much longer than the basal flagellar segments (Fig. 155). The specimen from Nigeria is assigned to this species but is extremely light coloured and has a more prominent hypopygium.

Hexacola quisnama sp. n.

(Figs 154, 172, 173)

DESCRIPTION. ♀. Antenna 13-segmented with sharply defined, 5-segmented club, slightly shorter than flagellar segments 1–8, segment 3 as long as 4+5, 4–8 each a little longer than wide (Fig. 154). Head, viewed frontally, a little longer than wide, eyes semi-circular, further apart than height of an eye measured medially, weakly converging towards clypeus, vertex polished. Pronotal plate produced forward, anterior and posterior connected by a medial bridge, the fovea open on lateral margins, pronotum either side of pronotal plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum polished, scutellar foveae kidney-shaped, smooth, polished, scutellar cup small, little longer than broad, not extending to apex of disc, scutellar disc with longitudinally radiating striae on lateral margins, coriaceous at apex, apex rounded (Fig. 173); propodeal carinae parallel, converging at base, densely woolly on lateral margins. Mesopleura and metapleura smooth, polished, mesopleural carinae distinct. Segment 1 of gaster obscured by dense ring of pubescence at base of tergite 2, complete on dorsal surface, tergites 2–4 visible in lateral view, tergite 2 the largest visible segment, apex of 3–5 punctate, hypopygium short, broad basally, ventral spine short. Wings densely pubescent with long apical hair fringe, forewing short, broad apically, radial cell of forewing open on margin, vein R_1 weakly indicated in part (Fig. 172). Legs normal except trochanters long, narrow, mid and hind coxae swollen basally. Colour: antenna yellowish brown basally, club segments darker, head brownish, thorax orange-yellow, gaster chestnut-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Massif Ruwenzori, riv. Kakalari, affl. Bombi, 1,725 m, 10.iv.1954 (*R. Vanschuytbroeck & H. Synave*) (MRAC).

Paratypes. **South Africa**: 3 ♀ (BMNH). **Uganda**: 1 ♀ (BMNH). **Zaire**: 11 ♀ (MRAC).

REMARKS. Distinguished from *quinqueclavata* by the antennal segment ratios (Fig. 154).

Hexacola septemius sp. n.

(Fig. 160)

DESCRIPTION. ♀. Antenna 13-segmented with sharply defined 7-segmented club, longer than flagellar segments 1–6 combined, segment 3 equal in length to 4+5 (Fig. 160). Head, viewed frontally, smooth, polished, with one or two hairs above supraclypeal area, cheeks converging, eyes further apart than height of an eye measured medially between eyes, malar grooves distinct. Pronotal plate projected forward, anterior and posterior parts connected by a narrow medial bridge, fovea on either side open laterally, lateral margins of pronotum on either side of plate without tufts of pubescence, at most a few setae present. Mesoscutum smooth, polished, without trace of notaulices, lateral bars of scutellum polished, scutellar fovea kidney-shaped, wider than long, scutellar cup long, narrow, polished, not extending to apex of disc, lateral margins of disc with broken longitudinal striations, basally reticulate-rugose, rounded apically. Propodeal carinae parallel, pubescent on lateral margins. Mesopleural suture complete, mesopleura and metapleura smooth, polished. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2, ring complete on dorsal surface, tergites 2–4 visible in lateral view, tergite 2 the largest, apex of tergite 2 and visible parts of tergites 3+4 punctate, hypopygium not prominent, ventral spine short. Wing surface pubescent, apical margins with a fringe of hairs, apex rounded, radial cell of forewing open on margin, vein R_1 projected partially along margin. Colour: antenna yellow basally, club segments darker, head, thorax and gaster chestnut-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: 10.vii.1952 (*H. de Saeger*) (MRAC).

Paratypes. **Zaire**: 2 ♀ (MRAC).

REMARKS. Distinguished from *amantia*, a closely similar species, by the sharply defined club of the antenna (Fig. 160).

Hexacola zama sp. n.

(Figs 148, 152, 174)

DESCRIPTION. ♀. Antenna 12-segmented with a sharply defined, 6-segmented club, the club much longer than flagellar segments 1–6, flagellar segments 4–6 as wide as long (Fig. 152). Head, viewed frontally, smooth, polished, supraclypeal area and mandibles with a few scattered hairs, eyes almost spherical, slightly further apart measured medially, than height of an eye, anterior tentorial pits weakly indicated, malar grooves complete, cheeks weakly converging, vertex polished. Pronotal plate projected forward, anterior and posterior parts connected by a narrow medial bridge, fovea on either side open laterally (*cf.* Fig. 148). Pronotum either side of plate with a few hairs. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum striate dorsally, polished laterally, scutellar fovea kidney-shaped, polished, scutellar cup elliptical, longer than wide, the rim paler than inner surfaces, apical quarter with a fovea, lateral margins of scutellar disc with broken reticulate-rugose sculpture appearing striated (Fig. 174), apex of disc rounded, surface reticulate-rugose. Propodeal carinae subparallel. Mesopleural carinae complete, meso- and metapleura smooth, polished. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2, complete on dorsal surface, tergites 3+4 partially visible, weakly punctate, hypopygium short, broad basally, ventral spine not visible. Wing surface pubescent, apical margins with a fringe of hairs, radial cell of forewing open on margin, vein R_1 extending partially along margin. Legs normal. Colour: antenna brownish yellow, head, thorax and gaster chestnut-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: N. Lac, Kivu, Rwanki, xii.1951 (*J. V. Leroy*) (MRAC).

REMARKS. This species is separated from *atropos* by the relative lengths of the antennal segments.

KLEIDOTOMA Westwood

Kleidotoma Westwood, 1833: 494. Type-species: *Kleidotoma psiloides* Westwood, by monotypy.

Aphyoptera Foerster, 1869: 343. Type-species: *Aphyoptera inustipennis* Foerster, by monotypy. [Synonymised by Hellén, 1960: 23.]

Aphiloptera Foerster, 1869: 351. Type-species: *Aphiloptera anisomera* Foerster, by monotypy. [Synonymised by Quinlan, 1967: 1.]

Agroscopa Foerster, 1869: 352. Type-species: *Agroscopa helgolandica* Foerster, by monotypy. [Synonymised by Quinlan, 1967: 1.]

Nedinoptera Foerster, 1869: 350. Type-species: *Nedinoptera halophila* Thomson, by monotypy. [Synonymised by Quinlan, 1967: 1.]

Rhynchacis Foerster, 1869: 349. Type-species: *Cothonaspis nigra* Hartig, by monotypy. [Synonymised by Quinlan, 1978: 25.]

Pentacrita Foerster, 1869: 349. Type-species: *Cothonaspis retusa* Hartig, by monotypy. [Synonymised by Weld, 1952: 210.]

Tetrahoptra Foerster, 1869: 349. Type-species: *Clidotoma heterotoma* Thomson, by subsequent designation of Ashmead 1903: 62. [Synonymised by Weld, 1952: 207.]

Tetratoma Cameron, 1890 preocc. Type-species: *Kleidotoma heterotoma* Thomson, by subsequent designation of Rohwer & Fagan, 1917: 376.

Schizosema Kieffer, 1901: 161. Type-species: *Cothonaspis emarginatus* Hartig, by subsequent designation of Ashmead, 1903: 62. [Synonymised by Weld, 1931: 233.]

DIAGNOSIS. ♀ antenna 13-segmented, clavate, with 3-segmented club in *psiloides* though a variable number of club segments are found within the genus. ♂ antenna 15-segmented, filiform, segment 3 the largest, curved, swollen at apex. Head, viewed frontally, longer than broad, eyes converging towards malar region, face smooth, polished, with long sparse hairs either side of clypeus, vertex striate. Pronotal plate produced forwards, anterior and posterior parts connected by a medial bridge, foveae on either side of bridge open on lateral margins (Fig. 183). Mesoscutum smooth dorsally, without trace of notaulices; mesopleura smooth, polished, suture complete; scutellar fovea large, deep, smooth, scutellar disc longitudinally striate, scutellar cup long, elliptical, not extending to apex of rounded disc (disc in some species conical or beak-shaped). Segment 1 of gaster obscured by a ring of pubescence at base of tergite 2, not complete on dorsal surface (Fig. 36). Segment 2 the largest in lateral view, segments 3–5 smaller, not always visible, hypopygium with long apical hairs. Wing surface pubescent, radial cell of forewing (Fig. 35), completely open on wing margin, apex of wing either incised (Fig. 177) or truncate (Fig. 196). Legs of normal size and shape. Colour: antenna yellowish, head, thorax and gaster brownish black, gaster chestnut-red, legs yellowish.

DISTRIBUTION. Old and New World.

REMARKS. At present keys to males are difficult to construct. In separating females emphasis has been given to the number of antennal club segments and the relative lengths of the basal flagellar segments. In some specimens the wings can be brachypterous to almost absent, particularly in the males. *K. psiloides* has not been recognised as occurring in the Afrotropical region.

Key to the Afrotropical species of *Kleidotoma* Westwood

Females

1 Antenna with 2-segmented club (Fig. 179) 2

– Antennal club with 3 or more segments 3

2 Antennal segment 2 as long as 3; apex of wing with wedge-shaped incision (Fig. 179); scutellar disc polished, cup long, narrow, not extending to apex of scutellum (Fig. 176); gaster impunctate .... ***morsum*** sp. n. (p. 286)

– Antennal segment 2 shorter than 3; apex of wing strongly arcuate (Fig. 208); scutellar disc striate, scutellar cup long, narrow, extending to apex of disc (Fig. 180); apex of tergite 2 and whole of tergite 3 strongly punctate (*cf.* Fig. 201) .... ***nigrans*** sp. n. (p. 286)

3 Antenna with 3-segmented club 4

– Antennal club with 4 or more segments 10

4 Antennal segments 4–10 longer than wide (Fig. 182); scutellar disc either normally rounded at apex or truncate 5

– Antennal segments 4–10 of varying length, some apical segments, excluding club segments, only as wide as long (Fig. 200); scutellar disc either rounded or spine-shaped apically (Figs 187, 205) 8

5 Pronotum laterally and occiput very strongly, densely strigose (Fig. 181); antennal segments 4–10 each progressively shorter, longer than wide, wider apically than basally (Fig. 182); apex of tergite 2 with a broad band of punctures (*cf.* Fig. 201) .... ***ventosus*** sp. n. (p. 288)

– Pronotum either smooth and polished, occiput not strongly strigose, or antenna not as above 6

6 Antennal segments 4–10 at least more than twice as long as wide, filiform, segment 3 longer than 4+5 (Fig. 188); apex of wing arcuate (Fig. 202) .... ***distenda*** sp. n. (p. 283)

– Antennal segments 4–8 at most twice as long as wide, 9–10 not twice as long as wide, segments wider apically than basally 7

7 Occiput finely strigose, including area between ocelli (Fig. 183); sides of pronotum striated; tergites 2–4 of gaster visible in lateral view (Fig. 184); scutellar disc with strong and close longitudinal striations, apex of disc almost square, scutellar cup extending to apex of disc (Fig. 185) .... ***erebus*** sp. n. (p. 284)

– Occiput smooth, polished; tergites 2–3 of gaster visible in lateral view; scutellar disc with weak, widely spaced longitudinal striations, apex of disc rounded; scutellar cup not extending to apex of disc (Fig. 186) .... ***arbitra*** sp. n. (p. 282)

8 Scutellar disc strongly produced apically to form a long, blunt, truncated spine.

Scutellar cup elliptical, lateral margins of scutellar disc striate; head strongly sculptured in frontal region, occiput strigose; sides of pronotal plate and mesoscutum with striate sculpture .... ***conica*** sp. n. (p. 283)

– Scutellar disc rounded apically, not produced to form a spine 9

9 Antennal segments 5–8 almost quadrate (Fig. 189), same width apically as basally ***strigosa*** sp. n. (p. 287)

– Antennal segments 4–6 longer than wide (Fig. 190), 7–10 as wide as long, conical, wider apically than basally .... ***favus*** sp. n. (p. 285)

10 Antenna with 4-segmented club 11

– Antennal club with 5 or more segments 12

11 Antennal club sharply defined (Fig. 191); apex of segment 2 and whole of visible parts of segments 3 and 4 of gaster densely punctate (*cf.* Fig. 184); hypopygium strongly protruding ***nitidiuscula*** sp. n. (p. 287)

– Antennal club not sharply defined, almost filiform (Fig. 192); gaster weakly punctate; hypopygium not protruding .... ***fimbriata*** sp. n. (p. 285)

12 Antenna with 5-segmented club, first segment of club distinctly smaller than four apical segments (Fig. 193) .... ***eala*** sp. n. (p. 283)

– Antennal club with 6 or more segments 13

13 Antennal club 6-segmented 14

– Antennal club 7-segmented, not sharply defined, almost filiform (Fig. 195).

Scutellar disc normally rounded apically, polished, with very weak striations (Fig. 194); apex of wing truncate (Fig. 196) .... ***norma*** sp. n. (p. 287)

14 Scutellar disc bifurcate at apex (Fig. 197), strongly striated laterally, apex of wing sharply incised (Fig. 198) .... ***bifurcata*** sp. n. (p. 282)

– Scutellar disc normally rounded at apex, polished, with weak striations laterally; apex of wing weakly arcuate (*cf.* Fig. 202) .... ***elongula*** sp. n. (p. 284)

Kleidotoma arbitra sp. n.

(Figs 175, 186, 204)

DESCRIPTION. ♀. Antenna 13-segmented with a distinct 3-segmented club, club segments with rhinaria, each wider and longer than preceding flagellar segments, segment 3 subequal in length to 4+5, segments 4–10 each longer than broad (Fig. 204). Head, viewed frontally, smooth, polished, with a few scattered hairs medially, eyes small, round, further apart measured medially than height of an eye, malar groove complete, anterior and tentorial pits distinct, occiput smooth, shining, pronotal plate projected forward, anterior and posterior parts connected by a medial bridge, foveae either side of bridge open on lateral margins. Pronotum either side of pronotal plate polished; mesopleura smooth, polished, suture distinct, mesoscutum smooth, polished, notaulices absent, scutellar disc striate on lateral margins, apex of disc rounded, scutellar cup long, elliptical, not extending to apex of disc, apex of cup with a large fovea, lateral bars of scutellum smooth on dorsal surface, striate laterally, scutellar foveae large, smooth, shallow, separated by narrow septum of cup (Fig. 186). Segment 1 of gaster obscured by a dense ring of hairs at base of tergite 2, not complete on dorsal surface, apex of tergite 2 smooth, polished, without punctures, tergite 3 visible laterally (Fig. 175). Wings pubescent on surface, radial cell of forewing completely open on margin, vein Rs_2 extended along wing margin, cell triangular, apex of wing arcuate with a long apical hair fringe. Colour: segments 1–10 of antenna dark yellow, 11–13 brownish yellow, head, thorax and gaster dark chestnut-red, coxae yellow with brownish apices, basal half of femora light brown, apex yellow, tibiae and tarsi dark yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Mossel Bay, Cape Province, x.1921 (*R. E. Turner*) (BMNH).

Paratypes. **South Africa**: 6 ♀ (BMNH). **Uganda**: 1 ♀ (BMNH). **Zaire**: 19 ♀ (MRAC). **Zimbabwe**: 8 ♀ (BMNH).

REMARKS. This species resembles *psiloides*, the Palaearctic species associated with *Leptocera manicta* Richards, but can be separated by the polished occiput.

Kleidotoma bifurcata sp. n.

(Figs 197, 198, 199, 201)

DESCRIPTION. ♀. Antenna 13-segmented, clavate with a 6-segmented club, not sharply indicated, club segments with rhinaria, segment 3 longer than 4, 4–7 each progressively shorter than each other, club segments 8–13 subequal, all longer than segment 7. Head, viewed frontally, with coriaceous sculpture on inner orbits, eyes twice as far apart measured medially than height of an eye, striations extending from lower margin of eye towards clypeal area, malar grooves obscured by striations, occiput strongly strigose. Pronotal plate, viewed dorsally, sculptured on anterior surface, polished on posterior surface, medial foveae open on lateral margins (Fig. 199). Pronotum either side of pronotal plate striated. Mesoscutum finely coriaceous except for a polished area where parallel lines would be, if present, lateral bars of scutellum strongly striated, scutellar disc strongly striate, apex of disc truncated, with a blunt spine on either side (Fig. 197), scutellar cup long, elliptical, bulbous apically, with large central fovea, scutellar foveae large, deep, polished. Mesopleura smooth, polished, suture pronounced (carina-like on lower margin, suture-like on upper margin), with coriaceous sculpture above and below, area below precoxal carina pubescent. Lateral margins of propodeum pubescent. Segment 1 of gaster obscured by a dense ring of pubescence, complete on dorsal surface, apex of tergites 2 and 3 with dense punctures, hypopygium pronounced (*cf.* Fig. 201). Wing surface with dotted hair bases, with apical hair fringe, apex of wing incised, radial cell of forewing open on margin (Fig. 198). Colour: antenna yellowish brown basally, club blackish brown, head and thorax blackish, gaster blackish brown dorsally, reddish yellow laterally, legs yellow brown.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Rweru (Volc. Mikeno), 2,400 m (Bambous), 26–27.vii.1934 (*G. F. de Witte*) (MRAC).

Paratype. 1 ♀, same data as holotype except 3.vii.1934 (BMNH).

REMARKS. This species cannot be confused with any other described in this paper. Apart from the shape of the head, the exceedingly distinctive shape of the entire scutellar area (Fig. 197) singles it out from all other species.

Kleidotoma conica sp. n.

(Figs 187, 200, 201)

Description. ♀. Antenna 13-segmented with the three apical segments forming a distinct club (Fig. 200), segments 4–10 each progressively shorter than preceding segment, apical width of each wider than basal breadth. Head, viewed frontally, strongly striated in frontal area below ocellus, malar grooves complete, clypeus with long scattered hairs, occiput strongly striated. Pronotal plate with lateral fovea open, striated. Pronotum and side margins of mesoscutum striated. Scutellar disc tapering to a blunt conical beak at apex, striate laterally, reticulate apically, lateral bars of scutellum striated, scutellar foveae large, shallow, polished, scutellar cup obscure (Fig. 187). Mesopleural suture distinct, with tuft of pubescence on anteroventral cavity. Gaster lenticular in shape, segment 1 obscured by a dense ring of pubescence at base of tergite 2, apex of tergite 3 with scattered punctures, 4 punctate, hypopygium short (Fig. 201). Wing surface with dotted hair bases, apical margins arcuate, with a hair fringe, radial cell of forewing open on margin, Rs_2 weakly extended along margin. Colour: antenna and legs dark yellow, first antennal segment and coxae dark brown, head and thorax black, gaster dark chestnut-red.

Material examined

Holotype ♀, **Zaire**: 2.i.1952 (*H. de Saeger*) (MRAC).
Paratype. **Zaire**: 1 ♀ (MRAC).

Remarks. A very distinctive species. The very long, truncated, spine-like projection of the scutellar disc and the strongly striated upper regions of the face distinguish it from all known species. The radial cell of the forewing is typical of *Kleidotoma* in shape, and the apex of the wing is weakly arcuate.

Kleidotoma distenda sp. n.

(Figs 188, 199, 202)

Description. ♀. Antenna 13-segmented with apical three segments forming a distinct club, segments 3–10 at least 3 × as long as broad (Fig. 188). Head, viewed frontally, smooth, polished, malar grooves distinct, eyes oval, further apart measured medially than height of an eye, occiput very weakly sculptured; pronotal plate weakly sculptured with a large fovea on either side of medial bridge, open laterally (*cf.* Fig. 199). Pronotum either side of pronotal plate smooth. Mesopleura smooth, shining, suture distinct; scutellar disc with weak broken sculpture to fine striations on lateral margins, apex rounded, weakly sculptured, scutellar cup long, narrow, not reaching apex of disc, scutellar foveae large, shining, separated by a wide septum at base of cup, lateral bars of scutellum smooth, shining. Segment 1 of gaster obscured by a moderately hairy ring at base of tergite 2, gaster impunctate. Wings densely pubescent, arcuate apically, with fringe of hairs, radial cell of forewing completely open on margin, cell triangular (Fig. 202). Colour: segments 1–10 of antenna brownish yellow, 10–13 brown, head dark brown, thorax and gaster chestnut-brown, legs yellow, hind coxa with longitudinal sculpture of varying degree.

♂ unknown.

Material examined

Holotype ♀, **South Africa**: Mossel Bay, Cape Province, 5–31.vii.1921 (*R. E. Turner*) (BMNH).
Paratypes. **Nigeria**: 6 ♀ (BMNH). **South Africa**: 11 ♀ (BMNH). **Zaire**: 28 ♀ (MRAC).

Remarks. Distinguished from *arbitra* by antennal segments 4–10, each being twice as long as wide.

Kleidotoma eala sp. n.

(Figs 193, 194)

Description. ♀. Antenna 13-segmented with a distinct 5-segmented club, segment 2 shorter than 3 but broader than 3, segment 3 subequal to 4+5 in length, 4 shorter than 5, 5–7 subequal, club segments 9–13 distinctly wider than segments 3–8 (Fig. 193). Pronotal plate small with a large fovea on either side of medial bridge, open laterally; pronotum either side of pronotal plate with tufts of pubescence, mesoscutum smooth, polished, scutellar disc weakly conical at apex, lateral margins either side of scutellar cup weakly striate, scutellar cup long, narrow, elliptical, scutellar foveae large, shallow (*cf.* Fig. 194), lateral bars of scutellum smooth, polished, extending past centre of cup. Mesopleura smooth, polished, suture distinct; propodeum with tufts of pubescence on lateral margins. Segment 1 of gaster obscured by dense ring of pubescence at base of tergite 2, not complete on dorsal surface, 2–4 visible in lateral view, punctate, hypopygium clearly visible in lateral view, not extending past apex of sheath. Wings pubescent on surface, apical margin weakly arcuate, with fringe of hairs, radial cell of forewing completely open on wing margin. Colour: antenna pale yellow, head, thorax and gaster dark brownish red, legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kivu, Kalondalac Ndaraga Mokotol, 1,750 m, 22–27.iii.1934 (*G. F. de Witte*) (MRAC).

REMARKS. Distinguished from other species by the 5-segmented club.

Kleidotoma elongula sp. n.

(Figs 180, 203, 207)

DESCRIPTION. ♀. Antenna 13-segmented, the apical 6 segments with rhinaria and forming a weak club, segment 2 shorter and broader than 3, 3 longer than 4, 4–7 subequal in length and breadth, cylindrical, 8–13 each longer than 7, wider medially than at either end (Fig. 203). Head, viewed frontally, smooth, polished, eyes further apart measured medially, than height of an eye, frontal area with scattered hairs, malar grooves percurrent, anterior tentorial pits distinct, occiput smooth. Pronotal plate small, with foveae on either side of medial bridge open (*cf.* Fig. 207). Mesoscutum smooth, polished; scutellar disc rounded at apex, very weakly striated on lateral margins, scutellar cup long, elliptical, with a large fovea on apical half, scutellar foveae large, lateral bars of scutellum smooth, shining, short (*cf.* Fig. 180). Mesopleural suture distinct, sterno-pleural suture distinct; propodeum with weak pubescence at base of tergite 2, complete on dorsal surface, tergite 2 the largest in lateral view, segment 3 partially visible in lateral view, gaster impunctate, hypopygium visible, not extending past apex of sheath. Wing surface densely pubescent, apex of wing arcuate, with a fringe of hairs, radial cell of forewing completely open on wing margin. Colour: antenna pale yellow, head, thorax and gaster dark brownish red, legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Mossel Bay, Cape Province, x.1921 (*R. E. Turner*) (BMNH).

Paratypes. **Zaire**: 1 ♀ (MRAC). **Zimbabwe**: 1 ♀ (BMNH).

REMARKS. This species is distinguished by the filiform antenna, and the six apical segments which are very weakly clavate and bear rhinaria (Fig. 203).

Kleidotoma erebus sp. n.

(Figs 182, 183, 184, 185, 198)

DESCRIPTION. ♀. Antenna 13-segmented, the apical 3 segments forming a distinct club, segment 3 1·5 × length of 4, 4–7 subequal in length, 8–10 almost as wide apically as long (*cf.* Fig. 182). Head, viewed frontally, smooth, polished, eyes oval, as far apart measured medially as height of an eye, inner orbits with a carina partially extending from outer area of antennal scrobe, malar grooves percurrent, anterior tentorial pits distinct, lower face with sparse setae extending to clypeal region, occiput strongly strigose. Pronotal plate projected forward, anterior and posterior parts joined medially by a broad bridge, fovea either side of bridge open laterally, with sparse pubescence (Fig. 183). Pronotum with striations either side of pronotal plate. Mesoscutum smooth, polished, lateral bars of scutellum striate, scutellar foveae large and deep apically, scutellar cup long, narrow, extending to apex of scutellar disc, apex of disc viewed dorsally almost square (Fig. 185). Mesopleura smooth, polished, carina complete, metapleura ridged above hind coxa; propodeum pubescent dorsally and laterally. Segment 1 of gaster obscured by a ring of hairs at base of tergite 2, tergite 2 the largest in lateral view, 3 and 4 partially visible, apex of tergite 2 and visible parts of 3 and 4 punctate, hypopygium not pronounced (Fig. 184). Wing surface pubescent, radial cell of forewing open on margin, Rs_2 partially extending along margin, apex of wing incised, with a fringe of hairs (Fig. 198); legs of normal proportions. Colour: antenna yellowish basally, club segments darker, head, thorax and gaster chestnut-red, legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: N. Lac Kivu, Rwanki, 15.ii.1952 (*J. V. Leroy*) (MRAC).

Paratypes. **Zaire**: 3 ♀ (MRAC).

REMARKS. Similar to *arbitra* in many respects but differing by the sculpture of the occiput and the shape of the scutellar disc.

Kleidotoma favus sp. n.

(Figs 183, 190, 199, 205)

DESCRIPTION. ♀. Antenna 13-segmented with a distinct 3-segmented club, club segments with rhinaria, wider and longer than preceding flagellar segments, segment 3 as long as 4+5, segments 4–10 as wide apically as long, some obconical (Fig. 190). Head, viewed frontally, smooth, polished, eyes small, almost round, further apart measured medially than height of an eye, malar grooves percurrent, anterior tentorial pits distinct. Pronotal plate, viewed dorsally, with a large fovea on either side of medial bridge, not pubescent, surface reticulate-rugose (*cf.* Fig. 199). Pronotum on dorsal and side margins at juncture with mesoscutum canaliculate-striate (*cf.* Fig. 183). Mesopleura smooth, shining, suture distinct. Mesoscutum smooth, polished, scutellar disc with strong striate sculpture on lateral margins, apex irregularly rounded, rugose, lateral bars of scutellum strongly striate, scutellar fovea large, shallow, polished, separated by septum of scutellar cup, scutellar cup long, narrow, not extending to apex of scutellar disc, with a fovea on apical half (Fig. 205). Segment 1 of gaster obscured by a dense ring of pubescence at base of tergite 2, tergite 2 the largest in lateral view, 3 and 4 partially visible, impunctate. Wing surface with dotted hair bases, radial cell of forewing completely open on margin, apex of wings incised, with apical hair fringe. Colour: antenna yellow at apex, becoming darker apically, head and thorax dark reddish black, gaster chestnut-red-brown, legs orange-yellow.

♂. Antenna 15-segmented, filiform, segment 3 curved, swollen distally.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, 1980 (*D. Jackson*) (BMNH).

Paratypes. **Cameroun**: 3 ♀, 2 ♂ (BMNH). **Kenya**: 12 ♀, 2 ♂ (BMNH). **Nigeria**: 1 ♀ (BMNH). **Uganda**: 2 ♀ (BMNH). **Zaire**: 44 ♀ (MRAC). **Zimbabwe**: 17 ♀, 15 ♂ (BMNH).

REMARKS. This species closely resembles *strigosa* but is separated by the flagellar segments of the antenna preceding the club.

Kleidotoma fimbriata sp. n.

(Figs 192, 205, 206)

DESCRIPTION. ♀. Antenna 13-segmented, almost filiform, club 4-segmented, not sharply defined, all with rhinaria, segment 3 clearly longer than 4 (Fig. 192), 4–9 almost subequal in length, the apical segments slightly progressively shorter than each preceding segment, club segments 10–13 subequal to each other, each longer than segment 9 and weakly swollen medially. Head, viewed frontally, smooth, polished, malar grooves distinct, eyes further apart measured medially than height of an eye, clypeus and area above with scattered pubescence, occiput striated. Pronotal plate projected forward, anterior part sculptured, posterior part polished; lateral bars and scutellar disc with coarse striations, scutellar cup elliptical, apex of disc rounded (*cf.* Fig. 205), scutellar foveae large, polished. Mesopleural suture distinct. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2, apex of tergite 2 and visible part of 3 with sparse punctures, hypopygium not protruding (Fig. 206). Wing surface pubescent, apex of wings incised, with a long fringe of hairs, radial cell of forewing open on wing margin. Colour: antenna brownish yellow, head and thorax black, gaster reddish brown, legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Ruanda, Kibga, Volc. Bishoke, 2,400 m, 8–9.xi.1935 (*G. F. de Witte*) (MRAC).

Paratypes. **Zaire**: 3 ♀ (MRAC).

REMARKS. This species has almost filiform antenna and an impunctate gaster, distinguishing it from *nitidiuscula*.

Kleidotoma montana Kieffer

Kleidotoma montana Kieffer, 1910*c*: 107. Holotype ♀, RWANDA: Vulkan Karishimbi, 2,700 m, xi. (Exped. Herzog Adolf Friedrich zu Mechlenburg).

The holotype of this species cannot be traced. In his description Kieffer indicates that the club of the antenna is 3-segmented, flagellar segments 4–10 quadrate, head smooth, polished. The scutellar cup is not mentioned in the description. In his figure of the whole insect, the wings have an apical fringe of hairs and are indented apically. Tergite 2 of the gaster has a ring of hairs at the base and appears complete on the dorsal surface; segments 2–5 are visible in lateral view. The drawing does not indicate whether or not any segments of the gaster are punctate, and the mesopleural suture is not indicated. The radial cell of the forewing is typical for *Kleidotoma*. A female from Zaire, Ruanda, Contrefort Est. Muhavura, 2,100 m, 28.i.1953 (*P. Basilewsky*), and determined by Benoit as *montana*, is in MRAC but cannot be accepted as this species. From the description and figure I am unable to recognise *montana* and regard it as incertae sedis. The figure indicates that the antennal segments 4–10 are quadrate as in *strigosa*.

Kleidotoma morsum sp. n.

(Figs 176, 177, 179, 207)

DESCRIPTION. ♀. Antenna 13-segmented, segment 2 as long as 3 and twice as wide, segment 3 as long as 4+5, 4 and 5 subequal, segments 6–11 subequal, short, wider than long, obconical, 12–13 forming a 2-segmented club, both with rhinaria present (Fig. 179). Head, viewed frontally, smooth, polished, eyes small, round, further apart measured medially than height of an eye, malar grooves weakly indicated. Pronotal plate projecting, weakly crenulate, lateral fovea open (Fig. 207). Mesoscutum smooth, polished, scutellar disc sharply conical at apex, lateral margins smooth, shining, without striations, scutellar cup narrow, elliptical, with a large fovea at apex (Fig. 176), lateral bars of scutellum smooth, shining, extending just past scutellar foveae, scutellar foveae small, deep. Mesopleural suture distinct. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2, hypopygium weakly visible, apex of tergite 2 without punctures, gaster lenticulate. Wing surface without pubescence, dotted hair bases present, apex of wing strongly incised, apical hair fringe long, radial cell of forewing completely open on margin (Fig. 177). Colour: antennal segments 1–11 dark yellow, 12–13 brownish yellow, head, thorax and gaster dark brownish red, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Port St. John, Pondoland, 15–31.v.1923 (*R. E. Turner*) (BMNH).
Paratypes. **Zaire**: 6 ♀ (MRAC).

REMARKS. Distinguished from the closely related *nigrans* by the elongate antennal segment 2, the wedge-shaped incision of the apical margin of the forewing, the polished scutellar disc and impunctate gaster.

Kleidotoma nigrans sp. n.

(Figs 178, 180, 207, 208)

DESCRIPTION. ♀. Antenna 13-segmented, segment 2 shorter than 3 and twice as wide, segment 3 as long as 4+5, slightly longer than 5, 5–9 each longer than broad and subequal to each other, 10 and 11 equal in length, shorter than 9, 12 and 13 forming a distinct club, both with rhinaria, club segments 12–13 together as long as segments 6–11 combined (Fig. 178). Head viewed frontally longer than wide, eyes further apart measured medially than height of an eye, mandibles large tridentate, with a few hairs in clypeal region, malar grooves distinct, occiput weakly sculptured. Pronotal plate small, projected forwards viewed frontally, ventral surface sculptured, lateral fovea either side of medial bridge open (*cf.* Fig. 207). Mesoscutum smooth, polished, suture distinct; scutellar disc rounded at apex, lateral margins with obsolete striate sculpture, shiny, scutellar fovea large, squarish, scutellar cup narrow, elliptical, with a large fovea apically (Fig. 180), lateral bars of scutellum short, weakly sculptured. Segment 1 of gaster obscured by a ring of pubescence at base of tergite 2, incomplete on dorsal surface, gaster lenticular, punctate, tergite 3 partially visible in lateral view. Wing surface dotted with hair bases, radial cell of forewing completely open on wing margin, apex of wing sharply incised, with apical hair fringe (Fig. 208). Colour: segments 1–11 of antenna dark brownish yellow, club segments 12 and 13 black, head, thorax and gaster chestnut-brown, legs clear yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Terr. Rutshuru, 7.iv.1937 (*Mission Prophylactique*) (MRAC).
Paratype. **Zaire**: 1 ♀, same data as holotype except 4.iv.1934 (MRAC).

REMARKS. Closely related to *morsum* but separated from it by a number of characters, particularly the striations of the scutellar disc, the elongate cup which extends to the apex of the disc, and the short antennal segment 2.

Kleidotoma nitidiuscula sp. n.

(Figs 191, 201, 209, 210)

DESCRIPTION. ♀. Antenna 13-segmented, segment 2 shorter than 3, 3 twice length of 4, equal to 4+5, 5 and 6 subequal in length, 7 and 8 subequal, slightly shorter than 6, 9 longer than 8, broader at base, 10–13 forming a 4-segmented club, club segments with rhinaria, segment 10 1·2 × length of 9, 11 and 12 equal in length, 13 slightly longer than 12 (Fig. 191). Face, viewed frontally, smooth, polished, malar grooves percurrent, eyes further apart measured medially than height of an eye, occiput with strong strigose sculpture. Pronotal plate projected forward, viewed dorsally, sculptured on basal half and hind margin of apical half, fovea on lateral margins open (Fig. 209); side margins of pronotum adjacent to pronotal plate sculptured, scutellar disc truncate at apex, strongly striate on lateral margins, scutellar cup long, narrow, elliptical, extending to apex of disc or beyond, lateral bars of scutellum striate on lateral margins, dorsal surface smooth, shining, scutellar foveae large, deep, shiny. Mesopleura smooth, polished, suture distinct. Segment 1 of gaster obscured by a dense ring of pubescence at base of tergite 2, tergites 2–4 visible in lateral view, apex of 2 and visible parts of 3 and 4 densely punctate (*cf.* Fig. 201), hypopygium not prominent. Wing surfaces with dotted hair bases, apex of forewing sharply incised, with apical hair fringe, radial cell of forewing completely open (Fig. 210). Colour: antennal segments 1–9 dark yellow, 10–13 brownish, head and thorax black, gaster reddish basally, black on dorsal and lateral surfaces, legs dark yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: '(Congo Belge PN.G.) Miss.II De Saeger, ii/Fd/17, 15.ix.1951. (Rec.H. de Saeger)' (MRAC).

REMARKS. This species is very similar to *fimbriata* but is distinguished by the sharply defined club segments and dense punctuation of the gaster.

Kleidotoma norma sp. n.

(Figs 194, 195, 196, 211)

DESCRIPTION. ♀. Antenna 13-segmented, filiform, segment 3 longer than 4, 4–6 subequal in length, 7–13 forming a weak club, distinguished by presence of rhinaria and the slight medial swelling of each segment, club segments 7–12 a little longer than preceding flagellar segments, segment 13 1·3 × length of 12 (Fig. 195). Face, viewed frontally, smooth, polished, area above clypeus raised, malar grooves percurrent, anterior tentorial pits large, clypeal margin with long sparse setae, occiput smooth, shiny, with broken sculpture. Pronotal plate projected forward, viewed dorsally, sculptured on anterior part, fovea either side of medial bridge open on lateral margins (Fig. 211). Pronotum either side of pronotal plate smooth, polished. Mesoscutum smooth, polished, with a few long scattered hairs; lateral bars of scutellum and scutellar disc very weakly striated, scutellar foveae smooth, polished, scutellar cup elliptical, apex of disc rounded (Fig. 194). Mesopleural suture distinct, lower part of pronotum adjacent to mesopleura striated, area below precoxal carina pubescent. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2, tergites 2 and 3 impunctate, hypopygium not protruding. Wing surfaces densely pubescent, truncate at apex which has an apical fringe of hairs, radial cell of forewing completely open on margin (Fig. 196). Colour: antenna brownish, head and thorax black, gaster blackish brown, legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Chishawasha, nr Salisbury, x.1979 (*A. Watsham*) (BMNH).

REMARKS. This species is separated by the inconspicuous 7-segmented club, which is almost filiform, and the presence of rhinaria on each club segment.

Kleidotoma strigosa sp. n.

(Figs 183, 189, 205, 211, 212)

DESCRIPTION. ♀. Antenna 13-segmented with a distinct 3-segmented club, each segment broader and longer than preceding flagellar segments, segment 3 as long as 4+5, segment 4 slightly longer than broad, 5–10 quadrate, as wide as long, apical and basal widths equal (Fig. 189). Head viewed frontally smooth, polished, malar grooves percurrent, eyes round, further apart measured medially than height of an eye, occiput with weak strigose sculpture. Pronotal plate, viewed dorsally, large, projected forward, fovea either side of medial bridge large, open on lateral margins, with tufts of pubescence (*cf.* Fig. 211). Pronotum on side margins at juncture with mesoscutum and pronotal plate strigose (*cf.* Fig. 183). Mesoscutum smooth, polished, scutellar disc with widely spaced longitudinal striations, apex elongate, rounded, reticulate, scutellar cup narrow, elliptical, not extending to apex of disc, apex of cup with a large fovea, lateral bars of scutellum short, striate, as long as scutellar foveae which are deep and separated by broad septum of cup (*cf.* Fig. 205). Mesopleura smooth, polished, suture distinct. Segment 1 of gaster obscured by a ring of dense pubescence, apex of tergite 2 and visible segments impunctate, hypopygium pronounced. Wing surface with very short pubescence, apex of wing strongly arcuate, with apical hair fringe, radial cell of forewing completely open on wide margin (Fig. 212). Colour: antenna dark reddish brown, head and thorax blackish red, coxae brownish red, femora, tibiae and tarsi brownish yellow.

♂. Antenna 15-segmented, flagellar segments 4–10 as broad as long.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, 1980 (*D. Jackson*) (BMNH).

Paratypes. **Cameroun**: 5 ♀, 2 ♂ (BMNH). **Kenya**: 11 ♀, 12 ♂ (BMNH). **Nigeria**: 1 ♀ (BMNH). **Uganda**: 2 ♀ (BMNH). **Zaire**: 42 ♀ (MRAC). **Zimbabwe**: 17 ♀ (BMNH).

REMARKS. A distinctive species, the quadrate flagellar segments 5–10 separate it from the closely related *favus*.

Kleidotoma ventosus sp. n.

(Figs 181, 182, 186, 210, 211)

DESCRIPTION. ♀. Antenna 13-segmented with a distinct 3-segmented club, club segments each broader and longer than the preceding flagellar segments, segment 3 subequal to 4+5, flagellar segments 4–11 each progressively shorter than each other, longer than wide, wider apically than basally (Fig. 182). Head, viewed frontally, smooth, polished, malar grooves complete, eyes almost round, further apart measured medially than height of an eye. Pronotal plate, viewed dorsally, protruding, with large fovea on either side of medial bridge, open laterally, smooth, shining (*cf.* Fig. 211). Pronotum on side margins at junction with mesoscutum and pronotal plate strongly canaliculate (Fig. 181). Mesopleural suture distinct, with fine reticulate sculpture below suture. Mesoscutum smooth, polished; scutellar disc striate, apex of disc rounded, reticulate, scutellar cup long, narrow, elliptical, not reaching apex of disc, apex of cup with a large fovea, lateral bars of scutellum strongly striate, scutellar foveae large, polished, with narrow septum of cup separating them (*cf.* Fig. 186). Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2, apex of tergite 2 and visible parts of tergites 3 and 4 punctate. Wing surfaces dotted with hair bases, apex of wing sharply incised with apical hair fringe, radial cell of forewing completely open on wing margin, vein Rs_2 weakly extending along margin of wing (Fig. 210). Colour: segments 1–10 of antenna dark yellow, club segments 11–13 brown, head dark brown-black, thorax black, except for propodeum and metapleura which are dark yellow-orange, legs dark yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Port St John, Pondoland, 1–5.iv.1923 (*R. E. Turner*) (BMNH).

Paratypes. **Ethiopia**: 1 ♀ (BMNH). **South Africa**: 3 ♀ (BMNH). **Zaire**: 4 ♀ (MRAC).

REMARKS. The length of the antennal segments and the densely strigose occiput distinguish this species.

NORDLANDERIA gen. n.

Type-species: *Nordlanderia plowa* sp. n.

DIAGNOSIS. ♀ antenna 13-segmented, clavate, with 8–9 club segments, ♂ antenna 15-segmented, filiform, segment 3 1·5 × length of 4, weakly curved, swollen distally. Head, viewed frontally, with eyes slightly further apart measured medially than height of an eye, inner margins almost parallel, malar space with a subocular suture, a few radiating striae on either side, supraclypeal area and anterior region of face with short protrusions (Fig. 16). Pronotal plate not protruding, very weakly indicated (Fig. 223), lateral fovea either side of median bridge open. Mesoscutum with or without notaulices, if present, very weakly indicated, converging sharply towards scutellum, scutellar foveae obsolete. Mesopleural suture complete, area below suture sculptured (Fig. 214). Propodeal carinae bowed, medial area polished, with tufts of pubescence on either side. Gaster with segment 1 almost obscured, base of tergite 2 partially enclosing it, when visible, short and broad, in the form of a weakly sculptured ring, tergite 2 the largest, occupying whole area of gaster viewed laterally, smooth, polished (Fig. 13). Wing surfaces pubescent, with ciliate margins, longest at apex, forewing with a closed radial cell although this can appear open in some specimens. Legs short, broad, coxae with scattered hairs, femora, tibiae and tarsi moderately pubescent.

DISCUSSION. *Nordlanderia* has close affinities with *Microstilba* Foerster, but differs in having pronounced triangular projections on the face and the notaulices almost absent. In those species where they are present they converge posteriorly towards the scutellum at a point almost mid-way between the pronotum and the scutellum. As with most eucoilids, the males are difficult to key and separate to species.

DISTRIBUTION. Afrotropical Region.

Key to the species of *Nordlanderia* gen. n.

Females

1 Hypopygium prominent, with long apical hairs (Fig. 222), segments 2–4 of gaster visible in lateral view .... ***acis*** sp. n. (p. 289)

– Hypopygium not prominent (Figs 215, 220), hairs sparse, segments 2–3 only of gaster visible in lateral view 2

2 Antennal club 8-segmented, segment 3 longer than 4 (Fig. 216); notaulices complete though very weakly indicated (Fig. 218); head, thorax and gaster black .... ***plowa*** sp. n. (p. 290)

– Antennal club 9-segmented, segments 3 and 4 of equal length; notaulices aberrant, almost absent anteriorly (Fig. 217); head and thorax black, gaster orange-yellow.... ***pallida*** sp. n. (p. 289)

Nordlanderia acis sp. n.

(Figs 214, 217, 219, 221, 222, 223)

DESCRIPTION. ♀. Antenna 13-segmented, weakly clavate, club 8-segmented, segment 3 1·2 × length of segment 4 (Fig. 219). Head, viewed frontally, smooth, polished, frons raised, malar grooves percurrent with striations on either side of them, cheeks below grooves extruded to form three tooth-like appendages (Fig. 221), eyes weakly converging, frontal area raised. Pronotal plate not projected, anterior and posterior parts connected by a medial bridge, with fovea on lateral margins open (*cf.* Fig. 223). Mesoscutum smooth, polished, notaulices very weakly represented, almost absent in some specimens, converging sharply towards scutellum, lateral bars of scutellum polished, scutellar cup slightly longer than wide, with a large apical fovea, scutellar disc with widely spaced radiating striae or ridges, scutellar foveae aberrant (Fig. 217). Mesopleural suture complete, area below suture coriaceous (*cf.* Fig. 214); propodeal carinae parallel, converging at base towards gaster, lateral margins densely pubescent. Segment 1 of gaster not completely visible in lateral view, in the form of a ring, tergites 2–3 visible in lateral view, hypopygium pronounced (Fig. 222). Wing surface pubescent, apical margins with a hair fringe, radial cell of forewing completely closed on wing margin, longer than wide. Legs normal, moderately pubescent. Colour: antenna yellow basally, apical segments darker, legs orange-yellow, head and thorax chestnut-brown, gaster lighter.

♂. Antenna 15-segmented; segment 3 longer than 4, curved, swollen distally.

MATERIAL EXAMINED

Holotype ♀, **Namibia**: Swakopmund, 26–30.i.1972 (BMNH).
Paratypes. **South Africa**: 31 ♀, 45 ♂ (BMNH).

REMARKS. This species is easily distinguished from others by the prominent hypopygium (Fig. 222).

Nordlanderia pallida sp. n.

(Figs 213, 217, 220, 223)

DESCRIPTION. ♀. Antenna 13-segmented, weakly clavate, with a weak 9-segmented club, segment 3 equal in length to segment 4. Head viewed frontally with scattered hairs between eyes, malar space with subocular suture distinct, with striae on either side of sutures, supraclypeal area and anterior region of face with three strongly projecting spine-shaped keels (*cf.* Fig. 213). Pronotal plate not projected forward, almost aberrant, not prominent, anterior and posterior parts connected by a medial bridge with an open fovea on either side of bridge (Fig. 223). Mesoscutum smooth, polished, with only the faintest indication of notaulices, sometimes virtually absent (Fig. 217); scutellar cup large, concave basally, rim of cup almost level with apex of scutellar disc which has radiating sculpture (Fig. 217). Mesopleural suture complete, area below suture coriaceous. Propodeal carinae weakly bowed, almost parallel, median area smooth, polished, sides of propodeum with tufts of pubescence. Segment 1 of gaster obscured by base of tergite 2, viewed laterally, in form of a thin ring, tergite 2 the largest, occupying whole of lateral surface of gaster (Fig. 220). Wing surface pubescent, with a long apical hair fringe, radial cell of forewing closed on margin. Legs with narrow coxae, femora, tibiae and tarsi moderately pubescent. Colour: antenna yellow, legs yellow, head and thorax black, gaster reddish yellow.

♂. Antenna filiform, segment 3 longer than 4, weakly curved, flattened medially on inner margin or surface.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Pretoria, i.1931 (*N. E. Munro*) (BMNH).

Paratypes. **Ghana**: 1 ♀, Accra, vi.1921 (*I. Ingram*) (BMNH), 1 ♀, 2 ♂, Irat (GERDAT).

REMARKS. This species is closely related to *plowa* but can be separated by the antennal characters and the absence of notaulices.

Nordlanderia plowa sp. n.

(Figs 213, 216, 218, 223)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, with a weakly defined 8-segmented club, segment 3 1·5 × length of 4 (Fig. 216). Head, viewed frontally, with scattered hairs between eyes which are almost parallel and slightly further apart than height of an eye measured medially, malar space with subocular suture distinct, with weak striae on either side, supraclypeal area and anterior region of face strongly protruding with tooth-like appendages (Fig. 213). Pronotal plate not protruding, viewed fronto-dorsally, flattened into pronotum (*cf.* Fig. 223), anterior and posterior parts of plate connected by a medial bridge with a fovea on either side, open laterally. Mesoscutum smooth, polished, with notaulices weakly indicated, converging towards scutellum, sometimes absent in anterior area (Fig. 218); scutellar cup large, rim of cup overhanging disc, viewed dorsally, basal half concave, apical half convex (Fig. 218); scutellar disc with radiating ridges. Mesopleura with a distinct suture, area below suture coriaceous; propodeal carinae bowed medially, inner area smooth, polished, lateral margins with tufts of pubescence. Segment 1 of gaster obscured, in the form of a narrow ring, tergite 2 the largest, tergites 3 and 4 sometimes visible in lateral view. Wing surface pubescent, with apical hair fringe, radial cell of forewing with a closed cell (this is sometimes difficult to appreciate). Legs with short broad coxae and scattered pubescence, femora, tibiae and tarsi moderately pubescent. Colour: antenna yellow basally, brownish apically, coxa and femur brownish, tarsus yellow, head, thorax and gaster black.

♂. Antenna 15-segmented, filiform, segment 3 longer than 4, curved, swollen distally.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, x.1979 (*A. Watsham*) (BMNH).

Paratypes. **Aldabra**: 1 ♂, Astove Atoll (BMNH). **Nigeria**: 4 ♀, 8 ♂ (BMNH). **Zaire**: 17 ♀, 43 ♂ (MRAC). **Zambia**: 5 ♂ (BMNH). **Zimbabwe**: 19 ♀, 13 ♂ (BMNH).

REMARKS. Distinguished from *pallida* by the presence of notaulices and by the antenna.

RHOPTROMERIS Foerster

Rhoptromeris Foerster, 1869: 344. Type-species: *Cothonaspis eucera* Hartig, 1841, by original designation [a junior synonym of *Cothonaspis heptoma* Hartig, 1840].

Miomoera Foerster, 1869: 352. Type-species: *Miomoera aberrans* Foerster, 1869, by subsequent designation, Rohwer & Fagan 1917: 371.

Hexamerocera Kieffer, 1901: 175. Type-species: *Eucoila rufiventris* Giraud, 1860, by subsequent designation, Ashmead, 1903: 66.

DIAGNOSIS. ♀ antenna 13-segmented, with 7-segmented club in type-species (this varies from species to species), all club segments bear rhinaria and are generally darker than basal segments of flagellum. Segment 3 longer than 4 in type-species. ♂ antenna 15-segmented, segment 4 longer than 3, curved, swollen distally (Fig. 225). Head, viewed frontally, round, slightly longer than wide, supraclypeal area raised, malar area with a groove or sulcus extending from bottom of eye to margin of clypeus. Pronotal plate, viewed dorsally, protruding, well developed (Fig. 6), lateral fovea on either side of plate enclosed by outer margins of anterior and posterior parts of plate. Mesoscutum smooth, polished, notaulices absent, in some species a row of hairs present in their place. Lateral bars of scutellum smooth, scutellar disc reticulate-rugose, sometimes with radiating striae from edge of narrow scutellar cup which has one or two fovea centrally. Mesopleurae smooth, shiny, mesopleural carina straight, metapleura sometimes with weak strigose sculpture ventrally and posteriorly; thorax with short dense pubescence on ventral parts. Propodeum with almost parallel carinae, either side of carinae with short dense pubescence. Segment 1 of gaster (petiole) visible in part laterally, crenulate (Fig. 249), base of tergite 2 with a ring of dense yellowish pubescence, usually complete on dorsal surface though usually incomplete in males (*cf.* Fig. 36), tergites 2–5 visible in ♀, 2–6 in ♂ in lateral view, hypopygium distinct (Fig. 227). Legs varying in length and robustness between species, fore-coxae slender, mid- and hind-coxae swollen, meta-tarsi as long as tarsal segments 2–4 combined, claws simple. Wings densely pubescent on surface, with apical fringe of hairs, radial cell of forewing long, between 2–3 × as long as width (Fig. 224), closed on front margin. Colour: antenna yellow basally, club segments darker, head and thorax blackish, gaster dark yellow-brown, legs yellowish, coxae and femora darker. *Rhoptromeris* is related to *Trichoplasta* and *Stentorceps*, sharing a derived character in the form of the pronotal plate. In all three genera the pronotal plate has the medial fovea between the anterior and posterior parts fused laterally. In most other genera the foveae or pits are open (Nordlander, 1982). *Rhoptromeris* has a characteristic radial cell, the veins *2r* and *Rs* (Nordlander, 1982*b*) and Rs_2 and Rs_1 (Quinlan, 1979; Eady & Quinlan, 1963) of about equal length. The scutellar cup in all three genera is relatively small. In the males the 4th antennal segment is longer than the 3rd and modified (Fig. 225).

DISTRIBUTION. Old and New World.

Key to the Afrotropical species of *Rhoptromeris* Foerster

Females

1 Antenna filiform, segment 3 generally subequal to or shorter than 4 (Fig. 229), 4–13 at least 4 × as long as wide, those segments with rhinaria weakly swollen medially, not forming a conspicuous club 2

– Antenna subclavate, apical segments 4–13 less than 4 × as long as wide, segment 3 rarely shorter than 4, either subequal to or longer than 4, club segments with rhinaria, wider apically than basally (Fig. 237) 10

2 Antenna with the 6 apical segments bearing rhinaria (Fig. 229); hypopygium pronounced, ventral spine short; pronotal plate with a transverse groove, anterior and posterior parts of plate fused laterally .... ***zeus*** sp. n. (p. 308)

– Antenna with segments 7–9 bearing rhinaria (Figs 230, 267, 278), hypopygium not pronounced, ventral spine variable in length; pronotal plate either with a transverse groove medially between anterior and posterior parts of plate or with two fovea enclosed on lateral margin 3

3 Antenna with the 7 apical segments bearing rhinaria 4

– Antenna with 8–9 apical segments bearing rhinaria 6

4 Pronotal plate with a transverse groove medially between anterior and posterior parts (*cf.* Fig. 250); antenna with segment 3 shorter than 4 (Fig. 230).
Scutellar cup oval, scutellar disc with weak broken sculpture laterally, apex with radiating sculpture (Fig. 231) .... ***oeta*** sp. n. (p. 302)

– Pronotal plate with lateral foveae separated by a medial bridge (*cf.* Fig. 6); antennal segment 3 shorter than 4 (Fig. 272) 5

5 Apical antennal segments of antenna darker than basal flagellar segments; scutellar cup elliptical, polished, scutellar disc smooth, polished .... ***cepheus*** sp. n. (p. 297)

– Apical 3 segments of antenna white, segments 3 and 4 subequal, scutellar cup long, narrow, scutellar disc with radiating ridged sculpture laterally (*cf.* Fig. 238) .... ***rwanki*** sp. n. (p. 305)

6 Antenna with 9 apical segments bearing rhinaria, weakly swollen medially, pronotal plate with lateral fovea separated medially by a bridge .... ***crito*** sp. n. (p. 297)

– Antenna with 8 apical segments bearing rhinaria; fovea of pronotal plate either separated medially or in the form of a furrow 7

7 Pronotal plate with a transverse groove separating anterior and posterior parts (*cf.* Fig. 250), no medial bridge between lateral pits apparent .... ***pagasa*** sp. n. (p. 302)

– Pronotal plate with two lateral fovea separated by a shallow medial bridge (*cf.* Fig. 275) connecting anterior and posterior parts, antennal segment 3 shorter than 4 8

8 Scutellar disc with strong radiating striations, apex with strongly radiating ridges (Fig. 234), scutellar cup long, elliptical; the 8 apical segments of antenna with prominent rhinaria, weakly swollen medially (Fig. 282); fovea on pronotal plate separated by a broad medial bridge (*cf.* Fig. 232) .... ***temesa*** sp. n. (p. 306)

– Scutellar disc with aberrant sculpture; pronotal plate with a narrow medial bridge connecting anterior and posterior parts (*cf.* Fig. 275) 9

9 Apical segments of antenna white; visible parts of gastral segments 3 and 4 punctate ***rutshuris*** sp. n. (p. 305)

– Apical segments of antenna darker than yellowish basal segments; segments 3 and 4 of gaster impunctate .... ***agis*** sp. n. (p. 295)

10 Antennal club 6-segmented 11

– Antennal club 7–8-segmented 15

11 Pronotal plate with a transverse groove between anterior and posterior parts, closed laterally (*cf.* Fig. 250), medial bridge not clearly defined 12

– Pronotal plate with two fovea between anterior and posterior parts, separated medially by a bridge (*cf.* Figs 232, 275) 13

12 Antennal club sharply indicated (Fig. 237); segment 3 as long as 4+5, 5–7 a little longer than wide (Fig. 237) .... ***afer*** sp. n. (p. 294)

– Antennal club weakly indicated, segments 8–13 weakly swollen medially, 3 and 4 subequal in length .... ***velia*** sp. n. (p. 307)

13 Apex of tergite 2 of gaster with scattered punctures, tergites 3 and 4 densely punctate on visible parts.

Segment 3 of antenna clearly longer than 4 (Fig. 240); scutellar cup elliptical, disc polished, rounded apically .... ***abba*** sp. n. (p. 294)

– Tergites of gaster impunctate, scutellar disc conical 14

14 Apex of scutellar disc weakly conical, surface reticulate-coriaceous (Fig. 244); antenna short, as long as distance between front of head and apex of gaster, club segments a little longer than wide (Fig. 242) .... ***diversa*** sp. n. (p. 299)

– Apex of scutellar disc weakly tapered (Fig. 245), surface reticulate-rugose; antenna longer than distance between front of head and apex of gaster, club segments of antenna at least 2 × as long as wide (Fig. 241) .... ***connatus*** sp. n. (p. 297)

15 Antennal club 7-segmented 16

– Antennal club 8-segmented 30

16 Pronotal plate with a weak transverse area between anterior and posterior parts, closed on lateral margins (Fig. 250) 17

– Pronotal plate with two fovea separated medially by a bridge between anterior and posterior, closed laterally (*cf.* Fig. 275) 20

17 Antennal segment 3 longer than 4, club segments sharply delineated (Fig. 247), at most twice as long as broad; hypopygium deep basally.

Ovipositor as long as base of hypopygium; pronotum, mesopleura and gaster yellow-brown, sharply contrasting with the black pronotal plate, thorax and head ***bicolor*** sp. n. (p. 296)

– Antennal segments 3 and 4 subequal and/or club segments not sharply delineated; hypopygium not deep basally (Fig. 249) 18

18 Apex of 3rd and 4th segment of gaster finely punctate (Fig. 249).

Basal six segments of antenna yellowish, club segments 7–10 black, 11–13 white ***zetes*** sp. n. (p. 308)

– Apex of 3rd segment and visible apical segment of gaster impunctate 19

19 Antennal segments 4–6 subequal in length, the seven apical segments with rhinaria, not forming a distinct club (Fig. 251) .... ***persius*** sp. n. (p. 304)

– Antennal segments 3–6 subequal, the seven apical segments with pronounced rhinaria, forming a distinct club (Fig. 253) .... ***equalis*** sp. n. (p. 300)

20 Apex of segment 3 of gaster and visible apical segments finely punctate 21

– Apex of segment 3 of gaster and visible apical segments impunctate (if some species weakly punctate then antennal segments 4–6 quadrate) 25

21 Antennal segment 3 as long as 4+5 22

– Antennal segment 3 shorter than 4+5 23

22 Club segments 7–13 of antenna not pronounced (Fig. 248), segments 4–6 each longer than broad; scutellar disc smooth, polished .... ***punctata*** sp. n. (p. 304)

– Club segments 7–13 pronounced (Fig. 259), segments 4–6 each as wide as long; scutellar disc reticulate-coriaceous .... ***enna*** sp. n. (p. 299)

23 Antennal segments 3 and 4 equal in length .... ***sinis*** sp. n. (p. 306)

– Antennal segment 3 longer than 4 24

24 Segments 2–4 of gaster visible in lateral view, densely punctate (Fig. 254); metapleura smooth, anteroventral cavity without a tuft of pubescence; club segments 2 × as long as wide (Fig. 255) .... ***bupalus*** sp. n. (p. 296)

– Segments 2–3 of gaster visible in lateral view, apex of 2 and visible part of 3 punctate; metapleura ridged, anteroventral cavity polished; club segments 3 × as long as wide (Fig. 256) .... ***attis*** sp. n. (p. 295)

25 Segment 3 of antenna longer than 4 26

– Segment 3 of antenna equal to or shorter than 4 29

26 Anteroventral cavity of metapleuron reduced; segment 3 of antenna as long as 4+5, 4–6 almost quadrate, club segments sharply defined (Fig. 259) .... ***enna*** sp. n. (p. 299)

– Anteroventral cavity of metapleuron with a tuft of pubescence; segment 3 of antenna shorter than 4+5 27

27 Foveae of pronotal plate very weak, broadly separated medially (*cf.* Fig. 262); club segments of antenna slightly longer than wide; whole insect completely pale yellowish orange, club segments very pale .... ***pallidus*** sp. n. (p. 303)

– Foveae of pronotal plate separated by a narrow medial bridge between anterior and posterior parts (Fig. 228); club segments of antenna clearly longer than wide, darker than flagellar segments except apical segments in some species 28

28 Club segments of antenna 3 × as long as wide, antenna as long as distance between face and apex of gaster; scutellar cup large, oval, scutellar disc with weak radiating ridges, strongest on apical margin; pronotum, mesonotum and gaster light reddish orange, contrasting with blackish head and thorax; antenna yellow basally, brownish medially, apical segment or segments white .... ***rufulus*** sp. n. (p. 304)

– Club segments of antenna 2 × as long as wide, antenna shorter than distance between face and apex of gaster; scutellar cup narrow, elliptical, scutellar disc weakly sculptured to smooth and polished; head, thorax and gaster blackish brown .... ***heptoma*** (Hartig) (p. 300)

29 Antennal segment 3 as long as 4; radial cell of forewing short, broad (Fig. 261); lateral margins of scutellar disc polished, apex with radiating sculpture (Fig. 263), scutellar cup elliptical ***cubitalis*** sp. n. (p. 298)

– Antennal segment 3 shorter than 4; radial cell of forewing elongate (Fig. 265); scutellar disc with radiating striae, scutellar cup pear-shaped (*cf.* Fig. 263) .... ***thales*** sp. n. (p. 307)

30 Antennal segment 3 longer than 4, 4 and 5 subequal.
Scutellar disc reticulate-coriaceous, apex weakly conical, scutellar cup almost oval (Fig. 273); pronotal plate with a transverse groove medially connecting anterior and posterior parts, closed on lateral margins .... ***naxos*** sp. n. (p. 302)

– Antennal segment 3 equal to or shorter than segment 4 31

31 Anterior and posterior parts of pronotal plate with a transverse groove between them (*cf.* Fig. 250) .... ***hebe*** sp. n. (p. 300)

– Anterior and posterior parts of pronotal plate with two lateral foveae, one either side of medial bridge (Fig. 275) 32

32 Antennal segment 3 shorter than 4, 5 longer than 4, apical segments of gaster punctate ***agis*** sp. n. (p. 295)

– Antennal segments 3 and 4 subequal in length, 5 shorter than 4, apical segments 7–12 darker, 13th segment white, basal segments yellowish; lateral margins of scutellar disc weakly striated, apex strongly rugose .... ***navius*** sp. n. (p. 301)

Rhoptromeris abba **sp. n.**

(Figs 232, 240, 243)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 longer than 4, subequal to 4+5, 6 longer than 5, 7 longer than 6, 8–13 with rhinaria, forming a club (Fig. 240). Head, viewed frontally, with eyes further apart measured medially than height of an eye, face with sparse hairs on lower face, supraclypeal area slightly raised, malar grooves distinct, extending from bottom of eye to edge of mandibles, mandibles yellowish brown, maxillary palp 4-segmented, labial palp 2-segmented. Pronotal plate with lateral fovea either side of medial bridge closed, either side of pronotal plate with sparse pubescence (*cf.* Fig. 232). Mesoscutum smooth, polished, notaulices absent (some specimens with hairs in their place). Scutellar disc rounded at apex, lateral margins of disc weakly striated, almost smooth, scutellar cup narrow, minute, scutellar foveae shallow, polished, axillae minute, polished. Mesopleural suture distinct, almost parallel with ventral margin, metapleura ridged, anteroventral cavity distinct. Propodeal carinae subparallel, densely pubescent. Segment 1 of gaster as broad as long, base of tergite 2 of gaster with ring of dense pubescence at base, not complete on dorsal surface. Tergite 2 the largest in lateral view, apical margin finely punctate, visible parts of tergites 3 and 4 densely punctate, hypopygium prominent, ovipositor short. Legs of normal shape, coxae robust, mid and hind coxae pubescent apically, tarsi 5-segmented. Forewings relatively narrow, surface densely pubescent, apical margin with a fringe of hairs, radial cell of forewing closed, vein R_1 short, one-third as long as Rs_2, veins M and $Rs+M$ obsolete. Colour: antenna yellowish basally, club segments dark, head, thorax and gaster dark chestnut-brown, legs orange-yellow.

♂. Antenna 15-segmented, 4th segment bent, swollen, outer margin weakly excavate (Fig. 243); gastral segments 2–6 visible laterally.

MATERIAL EXAMINED

Holotype ♀, **Kenya**: Kisumu, nr Lake Victoria, xi.1979 (*M. D. Croft*) (BMNH).
Paratypes. **Kenya**: 1 ♀, 1 ♂ (BMNH). **Zaire**: 3 ♀ (MRAC).

REMARKS. Closely related to *diversa* and *connatus* but distinguished by the punctate gastral segment.

Rhoptromeris afer **sp. n.**

(Figs 237, 238, 239, 250)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 as long as 4+5, 6 longer than 5, 7 longer than 6, 8–13 bearing rhinaria, forming a very distinct club (Fig. 237). Head, viewed frontally, with eyes as far apart measured medially as height of an eye, supraclypeal area weakly raised, anterior tentorial pits distinct, epistomal suture indicated, malar grooves percurrent, mandibles yellowish, maxillary and labial palps normal, i.e. 4- and 2-segmented respectively. Pronotal plate with a transverse groove medially between anterior and posterior parts, lateral margins of groove not open (*cf.* Fig. 250), either side of pronotal plate with a tuft of hairs. Mesoscutum smooth, polished, notaulices absent. Apex of scutellum rounded, lateral margins of scutellar disc with weak radiating striae, scutellar cup narrow, elliptical (Fig. 238), scutellar foveae deep, arched basally, axillae polished. Mesopleural suture distinct, metapleura with a few aberrant wrinkles, anteroventral cavity with a tuft of pubescence. Propodeal carinae subparallel, converging basally, pubescent on either side. Segment 1 of gaster obscured by a ring of pubescence at base of tergite 2, complete on dorsal surface, tergite 2 the largest segment in lateral view, 3 and 4 partially visible, all segments smooth, polished, hypopygium short, ovipositor long. Legs normal shape, coxae robust, hind coxa pubescent apically, tarsi 5-segmented. Wings densely pubescent, apical margin with a hair fringe, radial cell closed, R_1 short, one-third as long as Rs_2 (Fig. 239), veins M and $Rs+M$ obsolete. Colour: antenna yellowish basally, club segments dark, head, thorax and gaster dark brownish yellow, legs yellowish.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: N. Lac Kivu, Rwanki, 25.xii.1950 (*J. V. Leroy*) (MRAC).
Paratypes. **Zaire**: 4 ♀, same data as holotype (MRAC). **Uganda**: 1 ♀ (BMNH).

REMARKS. This species is one of two which can be separated from closely related species by the form of the pronotal plate. Together with *velia*, the medial area connecting the anterior and posterior parts is in the form of a shallow furrow.

Rhoptromeris agis sp. n.

(Figs 230, 246)

Description. ♀. Antenna 13-segmented, segment 3 shorter than 4, 5 longer than 4, 6–13 with rhinaria, forming a weak club. Head, viewed frontally, with eyes weakly converging, as far apart as height of an eye measured medially, anterior tentorial pits distinct, malar grooves present, face with scattered hairs extending to clypeal area, clypeus and mandibles yellowish, maxillary palp 4-segmented, labial palp 2-segmented. Pronotal plate with two fovea separated medially by a narrow bridge between anterior and posterior parts, closed on lateral margins, anterior part protruded (*cf.* Fig. 246), pronotum either side of plate with sparse pubescence. Mesoscutum smooth, polished, notaulices absent; scutellar disc rounded apically, scutellar foveae polished, lateral bars polished, scutellar disc with weak reticulate sculpture on lateral margins and long scattered setae, scutellar cup semi-oval, surface with a ring of minute hairs (*cf.* Fig. 230). Mesopleural suture distinct, metapleura weakly ridged, anteroventral cavity bare. Propodeal carinae weakly converging towards metanotal plate, either side of carinae pubescent. Segment 1 of gaster almost obscured by a ring of hair at base of tergite 2, sparse on dorsal surface, tergite 2 the largest in lateral view, occupying most of visible area, base of tergite 3 visible, impunctate, hypopygium long, narrow, ventral spine short. Legs long, thin, with fine pubescence on femora, tibiae and tarsi, tarsi 5-segmented. Forewings broad apically, surface densely pubescent, apex with a fringe of hairs, radial cell of forewing longer than wide, narrow basally, entirely closed on margin, veins *M* and *Rs+M* indicated, not pigmented. Colour: antenna yellowish basally, club segments dark, head, thorax and gaster dark chestnut-brown, legs yellowish.

♂ unknown.

Material examined

Holotype ♀, **Zaire**: Massif Ruwenzori, Kalonge, 2,600 m, Ruiss Karumbura, affl. Katauleko, 30.i.–21.ii.1953 (*P. Vanschuytbeock & J. Kekenbosch*) (MRAC).

Paratypes. **Zaire**: 5 ♀ (MRAC).

Remarks. This species is very similar to *rutshuris* but can be distinguished by the antennal and gastral characters listed in the key.

Rhoptromeris attis sp. n.

(Figs 246, 256, 257)

Description. ♀. Antenna 13-segmented, segment 3 longer than 4, 4 longer than 5, 5 and 6 equal in length, 7–13 forming a distinct club (Fig. 256). Head, viewed frontally, with eyes as far apart measured medially as height of an eye, a row of hairs extending from outside antennal sockets to clypeus, malar grooves distinct, maxillary palp 4-segmented, labial palp 2-segmented. Pronotal plate with two fovea, one on either side of medial bridge joining anterior and posterior parts of plate, anterior part protruding forward (*cf.* Fig. 246). Pronotum either side of pronotal plate pubescent. Mesoscutum smooth, polished, notaulices absent, in some specimens a row of hairs in their place; scutellar disc rounded apically, lateral and hind margins of disc weakly striate, scutellar cup oval, apex with a large round fovea, base with minute fovea, scutellar foveae kidney-shaped, polished, lateral bars of scutellum short, broad, polished. Mesopleural suture distinct, metapleura with three distinct ridges, anteroventral cavity bare, propodeal carinae bowed medially, either side of carinae pubescent. Segment 1 of gaster in the form of a weakly crenulated ring, obscured by a ring of pubescence at base of tergite 1, complete though sparse on dorsal surface, tergite 2 the largest in lateral view, occupying most of surface area of gaster, apex of tergite 2 and whole of visible part of 3 punctate, hypopygium weakly swollen medially, coxae, femora, tibiae and tarsi pubescent, tarsi 5-segmented. Wing surface pubescent, with apical hair fringe, forewing broad apically, radial cell a little antenna yellowish basally, apical segments darker, head and thorax chestnut-brown, gaster light reddish brown, legs yellowish.

♂. Antenna 15-segmented, filiform, segment 4 the largest, narrow basally, swollen and twisted medially (Fig. 257).

Material examined

Holotype ♀, **Zaire**: Makpe/8, 5.xi.1951 (*H. de Saeger*) (MRAC).

Paratypes. **Zaire**: 2 ♀, 7 ♂ (MRAC).

Remarks. Very similar to *bupalus* but separated by the gaster, the anteroventral cavity and the club segments.

Rhoptromeris bicolor sp. n.

(Figs 246, 247)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 longer than 4, 4 longer than 5, 5 and 6 subequal, club segments 7–13 sharply indicated, rhinaria prominent (Fig. 247). Head, viewed frontally, with eyes as far apart measured medially as height of an eye, a row of hairs present where frontal carinae would normally extend to clypeal area, clypeus and mandibles pubescent, malar grooves distinct, maxillary palp 4-segmented, labial palp 2-segmented, cheeks converging. Pronotal plate, viewed dorsally, protruding, medial bridge between anterior and posterior parts almost aberrant, a weak transverse area in its place, fovea either side closed laterally (Fig. 246), tufts of pubescence present on either side of plate. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum smooth, scutellar fovea polished, scutellar disc dull with sparse broken radiating sculpture, absent in some specimens, apex rounded, scutellar cup broad, elliptical, apex with a small fovea and a ring of smaller fovea around rim, scutellar disc with long scattered hairs. Mesopleural suture distinct, metapleura with weak ridges, anteroventral cavity with a few short hairs. Propodeal carinae almost parallel, lateral margins of propodeum pubescent. Segment 1 of gaster short, broad, crenulate, almost obscured by a dense ring of hairs at base of tergite 2, tergite 2 the largest, occupying whole of visible area in lateral view, tergites 3 and 4 not visible, gaster impunctate, hypopygium prominent, ventral spine long, broad apically in lateral view. Legs long, coxae swollen basally, femora short, swollen medially, tibiae and tarsi long, legs overall with scattered pubescence, tarsi 5-segmented. Wing surface pubescent, with apical fringe of hairs, forewing broad apically, radial cell closed on wing margin, longer than broad, broader apically than at base, veins *M* and *Rs+M* not indicated. Colour: antenna yellow basally, dark apically, head and mesoscutum black, dorsal surface of gaster chestnut-brown, pronotum, including plate, mesopleura and lower half of gaster, bright orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, iii.1980 (*A. Watsham*) (BMNH).

Paratypes. **Nigeria**: 2 ♀ (BMNH). **Zaire**: 10 ♀ (MRAC).

REMARKS. A distinctive and easily recognised species by the sharp colour contrasts of the various thoracic parts. Very closely related to *rufulus* but the colour pattern of the antenna of *rufulus* distinguishes it.

Rhoptromeris bupalus sp. n.

(Figs 250, 255)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 longer than 4, 4 longer than 5, 6 longer than 5, shorter than 7, 7–13 forming a distinct club (Fig. 255), club segments with rhinaria. Head, viewed frontally, with inner margins of eye further apart measured medially than height of an eye, a row of scattered hairs extending from outer margins of antenna to anterior tentorial pits, cheeks and mandibles with scattered hairs, malar grooves distinct, maxillary palp 4-segmented, labial palp 2-segmented, cheeks weakly convergent. Pronotal plate fovea either side of medial bridge between anterior and posterior parts closed on lateral margins (*cf.* (Fig. 250), pubescent on either side. Mesoscutum smooth, polished, notaulices absent, lateral bars polished, broad basally, scutellar foveae kidney-shaped, polished, scutellar disc polished, with scattered hairs, apex rounded, with radiating ridges, scutellar cup semi-oval with a transverse fovea apically. Mesopleural suture distinct, metapleura almost completely smooth, anteroventral cavity without hairs. Propodeal carinae converging towards metanotal plate, sparsely pubescent on outer margins, lateral margins of propodeum with tufts of pubescence. Segment 1 of gaster in the form of a ring, obscured by ring of hairs at base of 2, ring of hairs sparse on dorsal surface, tergites 2–4 visible in lateral view, 3 and 4 densely punctate, hypopygium not pronounced, with scattered submarginal hairs, ovipositor short. Legs normal shape, coxae elongate, weakly swollen medially, sparsely pubescent. Wing surface pubescent, with apical hair fringe, radial cell of forewing entirely closed on wing margin, veins *M* and *Rs+M* not indicated. Colour: antenna yellow, gaster chestnut-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishswasha, ii.1980 (*A. Watsham*) (BMNH).

Paratypes. **Kenya**: 1 ♀ (BMNH). **Uganda**: 1 ♀ (BMNH). **Zaire**: 3 ♀ (MRAC). **Zimbabwe**: 1 ♀, same data as holotype (BMNH). **Réunion**: 4 ♀ (*S. Quilici*).

REMARKS. Closely related to *attis* but separated by the antennal segments and the presence of a tuft of hairs in the anteroventral cavity of the metapleuron.

Rhoptromeris cepheus sp. n.

(Figs 246, 272)

Description. ♀. Antenna 13-segmented, filiform, segment 3 shorter than 4, 5–13 subequal, 7–13 with rhinaria, medially swollen (Fig. 272). Head, viewed frontally, with inner margins of eyes convergent, a row of widely spaced hairs along margins of supraclypeal area, malar grooves distinct, maxillary palp 4-segmented, labial palp 2-segmented. Pronotal plate protruded, anterior and posterior parts joined by a medial bridge, fovea either side of bridge closed on lateral margins (*cf.* Fig. 246). Pronotum either side of plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent, lateral bars broad-based, smooth, polished, scutellar fovea smooth, polished, kidney-shaped, lateral margins of scutellar disc polished, apex rounded, surface with radiating ridges, scutellar cup semi-oval, apical half with a transverse fovea and minute pits on basal and medial areas. Mesopleural suture distinct, parallel with pre-coxal suture, metapleura ridged, anteroventral cavity bare. Propodeal carinae almost parallel, very weakly bowed medially, pubescent on lateral margins. Segment 1 of gaster crenulate, in form of a ring, segment 2 of gaster with a ring of pubescence at base, complete on dorsal surface, tergites 2–4 of gaster visible in lateral view, tergite 2 the largest, smooth, impunctate, hypopygium pronounced, ovipositor short. Legs long, coxae elongate, femora short, swollen basally, tibiae and tarsi densely pubescent, tarsi 5-segmented. Wing surface pubescent, with apical hair fringe, radial cell of forewing entirely closed, veins *M* and *Rs+M* not indicated. Colour: antenna yellow basally, apical segments blackish, with rhinaria, head, thorax and gaster dark chestnut-brown, legs pale yellow.

♂ unknown.

Material examined

Holotype ♀, **Kenya**: Kisumu, Lake Victoria, xi.1979 (*M. D. Croft*) (BMNH).
Paratype. **Kenya**: 1 ♀, same data as holotype (BMNH).

Remarks. Distinguished from *rwanki* by the apical segments of the antenna and the polished scutellar disc.

Rhoptromeris connatus sp. n.

(Figs 241, 245)

Description. ♀. Antenna 13-segmented, segments 3 and 4 equal in length, 5 shorter than 4, 6 longer than 5, 6–7 subequal, 8–13 forming a weak club, swollen medially, bearing rhinaria (Fig. 241). Head, viewed frontally, with inner margins of eyes weakly converging, further apart than height of an eye measured medially, a row of hairs extending from outer margins of antenna to clypeal area, malar grooves distinct, clypeus and surface of mandibles with long scattered hairs, maxillary palp 4-segmented, labial palp 2-segmented. Pronotal plate with lateral fovea either side of pronotal plate closed. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum polished, scutellar fovea semi-circular, sculptured in part, scutellar disc weakly conical apically, reticulate-rugose, scutellar cup oval with a transverse fovea apically (Fig. 245). Mesopleural suture distinct, bowed medially, metapleura ridged, anteroventral cavity obsolete. Propodeal carinae parallel, densely pubescent on lateral margins. Segment 1 of gaster obscured by a ring of hairs at base of tergite 2, complete on dorsal surface, segment 1 crescent-shaped in lateral view, crenulate, tergite 2 the largest, occupying whole of visible surface in lateral view, impunctate, hypopygium weakly produced, ventral spine very short. Legs long, thin, pubescent, coxae elongate, swollen basally, femora short, swollen medially, tibiae and tarsi long. Wing surface pubescent with apical hair fringe, radial cell of forewing entirely closed on wing margin, veins *M* and *Rs+M* indicated by folds. Colour: antenna completely yellow, head, thorax and gaster light chestnut-brown, legs yellow.

♂ unknown.

Material examined

Holotype ♀, **Zaire**: Mabanga, 23.ix.1952 (*H. de Saeger*) (MRAC).
Paratypes. **Zaire**: 9 ♀ (MRAC).

Remarks. This species could be confused with those species of *Trichoplasta* with a closed radial cell and conical scutellum, but the sculpture of the scutellar disc and the venation distinguish it as a *Rhoptromeris*.

Rhoptromeris crito sp. n.

(Figs 232, 267, 274)

Description. ♀. Antenna 13-segmented, filiform, segment 3 shorter than 4, 4 longer than 5, 5–8 subequal in length, 9–13 shorter than 8, 11–13 white, 5–13 each with rhinaria, forming a very weak club (Fig. 267), segments 3–13 at least 4 × as long as wide. Head, viewed frontally, almost round, slightly longer than broad, eyes as far apart as height of an eye measured medially, weakly converging, a few widely spaced hairs present between margins of antenna and clypeus, anterior tentorial pits distinct. Pronotal plate protruding, medial bridge between anterior and posterior parts distinct, fovea either side enclosed laterally, either side of plate with tufts of pubescence (Fig. 232). Mesoscutum smooth, polished, anterior median lines and notaulices absent; lateral bars of scutellum polished, scutellar foveae kidney-shaped, scutellar cup a little longer than wide, with a transverse fovea on lower half, basal area of cup pitted, scutellar disc reticulate-rugose laterally, weakly ridged apically, rounded (Fig. 274). Mesopleural suture complete, metapleura weakly ridged, anteroventral cavity with short abraded hairs; lateral margins of propodeum sparsely pubescent, propodeal carinae almost parallel, very weakly bowed medially. Segment 1 of gaster short, broad, crenulate, obscured by a ring of dense pubescence at base of tergite 2, complete on dorsal surface, tergite 2 the largest in lateral view, tergites 3 and 4 partially visible, gaster impunctate, hypopygium not pronounced, with long subapical setae. Wing surface pubescent, with apical fringe of hairs, radial cell of forewing long, narrow basally, closed on wing margin, veins *Rs+M* weakly pigmented basally, obsolete towards apex. Legs long, slender, coxae elongate, weakly swollen medially, femora weakly swollen basally, tibiae and tarsi long, slender. Colour: antenna dark brown-orange basally, brown medially, apical segments light orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Madagascar**: Mandrake, ii.1944 (*A. Seyrig*) (MRAC).

REMARKS. This is the only species so far recognised which has rhinaria on 9 apical segments of the antenna (Fig. 267).

***Rhoptromeris cubitalis* sp. n.**

(Figs 261, 262, 263)

DESCRIPTION. ♀. Antenna 13-segmented, segments 3 and 4 equal in length, 5 shorter than 4, 5–13 subequal in length, club segments 7–13 with rhinaria, not sharply delineated. Head, viewed frontally, with inner margins of eye further apart measured medially than height of an eye, with a row of scattered hairs between outer margins of antenna and clypeus, anterior tentorial pits distinct, with a carina extending to clypeus, malar grooves distinct. Pronotal plate with two lateral foveae, one on either side of medial bridge between anterior and posterior parts, closed on lateral margins (Fig. 262), either side of plate with a tuft of pubescence. Mesoscutum smooth, polished, anterior median lines and notaulices absent though indications present below surface; lateral bars smooth, polished, scutellar fovea deep, scutellar disc with ridges radiating out from narrow elliptical scutellar cup (Fig. 263), cup with an apical fovea, disc truncate apically. Mesopleural suture distinct, metapleura polished, anteroventral cavity with a tuft of pubescence, area close to propodeum densely pubescent. Propodeal carinae parallel, pubescent. Segment 1 of gaster in the form of a crenulate ring, partially hidden by a dense ring of pubescence at base of tergite 2, complete on dorsal surface, tergites 2–4 visible in lateral view, impunctate, tergite 2 the largest, hypopygium not pronounced, ventral spine long. Legs long, slender, coxae weakly swollen basally, femora strongly swollen basally, tibiae and tarsi long, slender, coxae and femora with sparse hairs, femora tibiae and tarsi pubescent. Wing surface pubescent, with apical hair fringe, forewings broad apically with radial cell closed on wing margin (Fig. 261), short, little longer than broad, veins *M* and *Rs+M* weakly pigmented basally, obsolete apically. Colour: antenna dark orange-yellow, head dark brown, thorax and gaster light brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Secteur Tahisberimu, Talya Nerd, 23.iii.1954 (*P. Vanschuythbroeck & M. Synave*) (MRAC).

Paratype. **Zaire:** 1 ♀ (MRAC).

REMARKS. This species is close to *thales* but the length of antennal segment 3 is equal to 4, the lateral margins of the scutellar disc are polished and the radial cell is shorter than in *thales*.

Rhoptromeris diversa sp. n.

(Figs 242, 244, 246)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 as long as 4+5, 5 shorter than 6, 8–13 forming a distinct club, rhinaria prominent (Fig. 242). Head, viewed frontally, with eyes further apart measured medially, than height of an eye, with scattered hairs in a line extending from outer edge of antennal socket to clypeal area, anterior tentorial pits distinct, malar grooves distinct, clypeus and mandibular area with long scattered hairs. Pronotal plate with two fovea, one either side of medial bridge between anterior and posterior parts, closed on lateral margins (*cf.* Fig. 246), either side of plate pubescent. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum broad basally, smooth, polished, scutellar foveae half-moon-shaped, polished, scutellar disc weakly conical apically, surface rugose, scutellar cup semi-oval, apex with a transverse fovea, base pitted (Fig. 244). Mesopleural suture distinct, metapleura ridged, anteroventral cavity polished. Propodeal carinae parallel, sides of propodeum weakly pubescent. Segment 1 of gaster in the form of a crenulate ring, partially hidden by ring of pubescence at base of tergite 2, tergite 2 the largest in lateral view, segment 3 visible, gaster impunctate, hyopygium small, ovipositor short. Legs short, robust, coxae and femora weakly swollen basally, tibiae stout apically, tarsi short, stout, coxae sparsely pubescent, tibiae and tarsi moderately pubescent. Wing surface pubescent, apical margin with a fringe of hairs, forewing narrow, radial cell closed on margin, longer than broad, veins *M* and *Rs+M* not indicated. Colour: antenna yellow basally, brownish apically, head, thorax and gaster light orange-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Cape Province, Somerset East, 23–31.xii.1930 (*R. E. Turner*) (BMNH).

Paratypes. **South Africa**: 1 ♀, same data as holotype (BMNH). **Uganda**: 1 ♀ (BMNH). **Zaire**: 7 ♀ (MRAC).

REMARKS. The absence of punctures on the gaster and the weakly conical scutellum separate this species from *abba*, and the lengths of the individual club segments separate it from *connatus*, see key.

Rhoptromeris enna sp. n.

(Figs 246, 259)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 as long as 4+5, 4–6 subquadrate, 7–13 forming a distinct club (Fig. 259). Face, viewed frontally, with eyes as far apart as height of an eye measured medially, face with a row of scattered hairs extending from outer margins of antenna to clypeus, malar grooves distinct, lower face with scattered hairs. Pronotal plate with two foveae, one on each side of medial bridge between anterior and posterior parts of plate, bridge narrow (*cf.* Fig. 246), fovea closed on lateral margins. Pronotum either side of pronotal plate with tufts of pubescence. Mesoscutum smooth, polished, anterior median lines and notaulices absent; lateral bars of scutellum polished, scutellar disc reticulate-rugose-coriaceous, rounded apically, scutellar cup narrow, elliptical, apex with a large transverse fovea, basal half sculptured, rim of cup broad. Mesopleural suture distinct, metapleura with a weak ridge on margins closest to propodeum, anteroventral cavity with a tuft of pubescence. Propodeal carinae weakly bowed medially, either side of propodeum pubescent. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2, tergite 2 the largest in lateral view, 3–4 partially visible, apex of tergite 2 and visible parts of 3 and 4 punctate, hypopygium prominent, ventral spine short, subbasal hairs present. Legs normally proportioned, mid and hind coxae swollen basally, femora swollen basally and medially, tibiae widest apically, tarsi long, slender, femora, tibiae and tarsi pubescent. Wing surface pubescent, with apical hair fringe, radial cell of forewings closed, longer than broad, veins *M* and *Rs+M* not pigmented, folds indicated. Colour: antenna yellowish basally, darker apically, head, thorax and gaster dark chestnut-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Ruwenzori, Riv. Katunda, 1,600 m, 8.i.1954 (*H. Synave*) (MRAC).

REMARKS. This species is closely related to *punctata* but is distinguished by antennal segments 4–6 being subquadrate and by the sculpture of the scutellar disc.

Rhoptromeris equalis **sp. n.**

(Figs 253, 290)

DESCRIPTION. ♀. Antenna 13-segmented, segments 3–6 subequal in length, 7–13 with rhinaria, forming a distinctive club, each swollen medially (Fig. 253). Head, viewed frontally, with eyes converging weakly, narrowest at a point between inner margins of eyes, and less than height of an eye, with a row of scattered hairs between outer antennal sockets and epistomal suture, anteroventral pits and malar grooves distinct, clypeus and mandibular area with sparse pubescence. Pronotal plate with a transverse groove between anterior and posterior parts of plate, medial bridge not indicated (Fig. 290), lateral margins of groove closed. Mesoscutum smooth, polished, notaulices absent, lateral bars of scutellum small, polished, scutellar fovea oval, polished; scutellar disc with radiating ridges, apex rounded. Mesopleural suture distinct, metapleural ridges on ventral margins, anteroventral cavity bare. Propodeal carinae bowed medially, densely pubescent on lateral margins. Segment 1 of gaster not visible, obscured by a dense ring of hairs at base of tergite 2, tergite 2 the largest, 3 and 4 partially visible in lateral view, gaster impunctate, hypopygium small, ventral spine not exposed. Legs normal, coxae elongate, swollen basally, femora swollen basally, tibiae swollen apically, tarsi slender. Wings long, narrow, surfaces pubescent, margins with a fringe of hairs, radial cell of forewing closed on margin, slightly longer than broad, veins *M* and *Rs+M* not pigmented, only folds indicated. Colour: antenna orange-yellow basally, apical segments darker, head and thorax dark chestnut-brown, gaster chestnut-red, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, 29.vii.1979 (*D. Jackson*) (BMNH).
Paratypes. **Cameroun**: 2 ♀, same data as holotype (BMNH). **Zaire**: 3 ♀ (MRAC).

REMARKS. Distinguished from *persius* by the distinct club with pronounced rhinaria on each segment.

Rhoptromeris hebe **sp. n.**

(Fig. 250)

DESCRIPTION. ♀. Antenna 13-segmented, segments 3+4 subequal, 5 shorter than 4, 6–13 forming a weak club, each segment with rhinaria. Head, viewed frontally, with inner margins of eyes further apart than height of an eye measured medially, face with scattered hairs, anterior tentorial pits distinct, malar grooves distinct, clypeus and mandibles sparsely pubescent. Pronotal plate with a transverse groove medially between anterior and posterior parts of plate, medial bridge between both parts not apparent (*cf.* Fig. 250), groove closed on lateral margins, either side of plate with tufts of pubescence. Mesoscutum smooth, polished, scutellar foveae half-moon-shaped, polished; lateral bars of scutellum narrow, polished; scutellar disc rounded apically, lateral surfaces smooth, with radiating ridges apically. Mesopleural suture distinct, metapleura weakly ridged, anteroventral cavity with a minute tuft of hair. Propodeal carinae parallel, almost as far apart as their length, with tufts of pubescence on outer margins. Segment 1 of gaster crescent-shaped, viewed laterally, crenulate, partially obscured by a ring of dense pubescence at base of tergite 2, complete on dorsal surface, tergite 2 the largest, 3 and 4 partially visible in lateral view, gaster impunctate, hypopygium broad basally, ventral spine short, with sparse subbasal hairs. Legs normal, mid and hind coxae swollen, hind coxae elongate, femora swollen basally, tibiae broader apically, all pubescent, tarsi 5-segmented. Wings narrow, surfaces pubescent, apical margins with a fringe of hairs, radial cell of forewing closed on margin, longer than broad, veins *M* and *Rs+M* not pigmented, weakly indicated by folds. Colour: antenna yellowish basally, club segments darker, head, thorax and gaster yellowish brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: 18.ix.1952 (*H. de Saeger*) (MRAC).
Paratypes. **Zaire**: 10 ♀ (MRAC).

REMARKS. Closely resembles *navius* but distinguished by the pronotal plate (see key).

Rhoptromeris heptoma (Hartig)

(Figs 7, 224, 225, 226)

Cothonaspis heptoma Hartig, 1840: 201. Holotype ♀, GERMANY (ZSBS).

Cothonaspis eucerus Hartig, 1841: 357. Holotype ♀, GERMANY (ZSBS). [Synonomy by Cameron, 1890: 206; Hellén, 1960: 8.]

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 longer than 4, 4 longer than 5, 5 and 6 subequal in length, 7–13 forming a distinct club (Fig. 7). Face, viewed frontally, with eyes further apart than height of an eye measured medially, face with a row of hairs extending from outer margins of antennal sockets to clypeus, malar grooves distinct, supraclypeal area and mandibular area with sparse scattered hairs. Pronotal plate with two fovea, one each side of medial bridge between anterior and posterior parts of plate, either side of plate with a tuft of pubescence on lateral margins of pronotum. Mesoscutum smooth, polished, notaulices absent, sparse hairs along margin with pronotum; lateral bars of scutellum polished, scutellar foveae almost round, scutellar disc punctate-reticulate to almost smooth, rounded apically, scutellar cup longer than broad, elliptical (Fig. 226). Mesopleural suture strongly bowed medially, metapleura mainly smooth with a few ridges, anteroventral cavity with a tuft of hairs. Propodeal carinae bowed medially, pubescent laterally. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2, only a crescent-shape apparent, tergites 2–4 visible in lateral view, impunctate, hypopygium not prominent, ventral spine short, subbasal hairs present. Legs normal, mid and hind coxae swollen, slender, with tufts of hair, femora swollen basally, tibiae widest apically, slender, all segments of legs weakly pubescent. Wing surfaces pubescent, margins with apical hair fringe, radial cell of forewing closed on margin, Rs_2 and Rs_1 of equal length, *M* and *Rs+M* indicated (Fig. 224). Colour: antenna yellow basally, dark apically, head, thorax and gaster shining black-brown, legs yellowish.

♂. Antenna 15-segmented, segment 3 curved on outer margin, weakly swollen apically, segment 4 twice length of 3, curved, swollen, 5–15 filiform (Fig. 225).

MATERIAL EXAMINED

South Africa: 3 ♀ (BMNH). **Zaire**: 3 ♀ (MRAC).

REMARKS. *R. heptoma* is a parasite of Chloropidae (Nordlander, 1978). The specimens from South Africa and Zaire are very similar to European *heptoma* but differ very slightly in colour and the form of the pronotal plate.

Rhoptromeris navius sp. n.

(Figs 275, 276)

DESCRIPTION. ♀. Antenna 13-segmented, segments 3 and 4 subequal in length, 5 shorter than 4, 6–13 forming a club, rhinaria prominent. Head, viewed frontally, with eyes weakly convergent, further apart measured medially than height of an eye, a row of scattered long hairs extends from outer margin of antennal sockets to clypeal area, clypeus and mandibles with sparse hairs, anterior tentorial pits and malar grooves distinct; pronotal plate, viewed frontally, angular laterally, anterior and posterior parts separated medially by a bridge with a fovea on either side, closed on lateral margins (Fig. 275), lateral margins either side of pronotal plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent, in their place a row of sparse hairs; lateral bars of scutellum polished, scutellar fovea lenticular in shape, smooth, polished, disc reticulate-rugose, scutellar cup elliptical, a little longer than broad, rim distinct, apex with a large fovea, apical margin of disc rounded. Mesopleural suture distinct, metapleura with longitudinal ridges, anteroventral cavity with a tuft of hairs. Propodeal carina parallel, weakly pubescent medially, strongly pubescent laterally. Segment 1 of gaster partially visible in lateral view, in the form of a crenulate ring, tergite 2 of gaster with a dense ring of pubescence basally, entire on dorsal surface, tergites 2–4 of gaster visible in lateral view, tergite 2 the largest, apex of 2 and visible parts of 3 and 4 punctate, hypopygium not pronounced, ventral spine short, subbasal hairs present. Legs long, slender, mid and hind coxae weakly swollen, femora swollen basally, tibiae broadest apically, tarsi 5-segmented. Wings relatively long, slender, surface pubescent, apical margins with a fringe of hairs, radial cell of forewing closed on margin, narrow basally, veins *M* and *Rs+M* not indicated (Fig. 276). Colour: antenna yellow basally, median segments blackish brown, apical segments yellowish, head and thorax blackish, gaster chestnut-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: 26.ix.1951 (*H. de Saeger*) (MRAC).

Paratypes. **Kenya**: 2 ♀ (BMNH). **Zaire**: 4 ♀ (MRAC). **Zimbabwe**: 2 ♀ (BMNH).

REMARKS. This species has an 8-segmented club with a distinctive arrangement of colour; this and the relative lengths of the antennal segments enable it to be easily separated from other species.

Rhoptromeris naxos sp. n.

(Figs 250, 268, 273)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 longer than 4, 4 and 5 subequal, 5 shorter than 6, 6–13 forming a club, rhinaria prominent (Fig. 268). Head, viewed frontally, with eyes further apart measured medially than height of an eye, face with a row of scattered hairs extending from outer edges of antennal sockets to anterior tentorial pits, malar grooves distinct, mandibles with sparse hairs. Pronotal plate, viewed frontodorsally, without a bridge between anterior and posterior parts, separated medially by a transverse groove closed laterally, lateral margins of plate angular (*cf.* Fig. 250), either side of plate with tufts of pubescence. Mesoscutum smooth, polished, with a row of hairs in place of notaulices; lateral bars of scutellum polished, scutellar fovea kidney-shaped, scutellar disc weakly sculptured laterally, apex weakly rounded, rugose (Fig. 273). Mesopleural suture distinct, metapleura strongly ridged on ventral margin, anteroventral cavity without hairs. Propodeal carinae bowed medially, lateral margins of propodeum weakly pubescent. Segment 1 of gaster, viewed laterally, wider than long, in the form of a crenulate ring, tergites 2–4 visible in lateral view, tergite 2 the largest with a ring of pubescence at its base, apex of 2 and visible parts of 3 and 4 punctate, hypopygium not pronounced, ventral spine not projecting. Legs pubescent, with long mid and hind coxae, swollen from base to midway to apex, femora short, swollen basally, tibiae broad apically, tarsi 5-segmented. Wing surfaces pubescent, with apical fringe of hairs, radial cell of forewing closed on margin, veins *M* and *Rs+M* absent. Colour: antenna yellow basally, apical segments darker, except segment 13 yellow, head, thorax and gaster reddish chestnut-brown. Legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kanayabayonga, Kubasha, 1,760 m, 7.xii.1934 (*G. F. de Witte*) (MRAC).
Paratypes. **Uganda**: 1 ♀ (BMNH). **Zaire**: 13 ♀ (MRAC).

REMARKS. This species is separated by the antennal segment ratios (Fig. 268).

Rhoptromeris oeta sp. n.

(Figs 230, 231, 250)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 shorter than 4, 4 longer than 5, 5–6 subequal in length, 7–13 weakly swollen medially, with rhinaria, the whole filiform, club segments not sharply defined (Fig. 230). Head, viewed frontally, with eyes converging, as far apart ventrally as height of an eye measured medially, scattered hairs extending from antennal sockets to clypeal margin, malar grooves distinct, anterior tentorial pits distinct. Pronotal plate with a transverse groove between anterior and posterior parts, closed on lateral margins (*cf.* Fig. 250). Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum smooth, polished, scutellar foveae lenticular, lateral margins of disc weakly sculptured, apex with radiating sculpture, apical margin rounded (Fig. 231). Mesopleural suture distinct, metapleura ridged, sparsely pubescent on upper margin, anteroventral cavity with tuft of pubescence; propodeal carinae parallel, sides of propodeum pubescent. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2, visible in lateral view, tergite 2 the largest, gaster impunctate, hypopygium pronounced, ventral spine with subbasal hairs. Legs long, slender, coxae elongate, weakly swollen basally, narrow apically, femora swollen basally, apical half narrow, tibiae as long as tarsi. Wings broad apically, surface pubescent, apical margins with a fringe of hairs, radial cell of forewing closed on margin, veins *M* and *Rs+M* indicated, weakly pigmented. Colour: antenna dark orange-yellow, apical segments same colour as basal segments, in some specimens yellowish apically, head, thorax and gaster chestnut-brown, gaster orange-yellow, legs yellow.

♀ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: P.N.A., 30.i.–21.xii.1953 (*P. Vanschuytbroeck & J. Kekenbosh*) (MRAC).
Paratypes. **Zaire**: 10 ♀, same data as holotype except dates (MRAC).

REMARKS. A very distinctive species with thread-like antenna (Fig. 230).

Rhoptromeris pagasa sp. n.

(Figs 231, 233, 278)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 shorter than 4, 4 and 5 equal in length, 6–13 subequal in length, with rhinaria, not forming a distinct clavate shape (Fig. 278). Face, viewed frontally, with eyes measured medially as close together as height of an eye, face with sparse scattered hairs, malar groove distinct, mandibular area with sparse hairs. Pronotal plate with a transverse furrow between anterior and posterior parts, furrow closed on lateral margins (Fig. 233); either side of plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum polished, scutellar fovea kidney-shaped, polished; scutellar disc with aberrant sculpture laterally, almost smooth, rugose apically, scutellar cup elongate, rim thick (*cf.* Fig. 231), apex of disc rounded. Mesopleural suture distinct, metapleura smooth, anteroventral cavity with a tuft of hairs. Propodeal carinae almost parallel, weakly bowed apically, lateral margins pubescent. Segment 1 of gaster, viewed laterally, crescent-shaped, partially obscured by a ring of dense pubescence at base of tergite 2, tergites 2–4 visible in lateral view, tergite 2 the largest, occupying almost whole visible area, segments 3 and 4 only partially visible, gaster impunctate, hypopygium pronounced, visible part of ventral spine as long as base of hypopygium. Legs normal, coxae longer than broad, swollen basally, femora swollen from base for two-thirds of length, tibiae widest apically, meta-tarsi slender, longer than remaining combined tarsal segments. Wing surfaces pubescent, apical margins with a fringe of hairs, radial cell closed on margin, longer than broad, veins *M* and *Rs*+*M* not indicated. Colour: antenna yellow basally, 8 apical segments darker than basal segments, head, thorax and gaster orange-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, malaise trap, ix.1979 (*D. Jackson*) (BMNH).

Paratypes. **Zaire**: 10 ♀ (MRAC). **Cameroun**: 1 ♀, same locality as holotype, different date (BMNH).

REMARKS. This species is closely related to *temesa* but can be separated by the relative lengths of antennal segments 3 and 4 and the form of the pronotal plate.

Rhoptromeris pallidus sp. n.

(Figs 246, 264)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 as long as 4+5, 5 and 6 subequal in length, 7–13 forming a distinct club. Head, viewed frontally, with eyes further apart measured medially than height of eye, eyes diverging posteriorly, face with sparse hairs extending from base of antennal sockets to clypeal area, malar grooves distinct, anterior tentorial pits not clearly defined, apex of clypeus with long scattered hairs extending over mandibles. Pronotal plate with two medial fovea between anterior and posterior parts, separated by a broad medial bridge, closed on lateral margins (*cf.* Fig. 246). Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum polished basally, broader than long, scutellar fovea polished, scutellar disc rounded apically, surface with sparse weak radiating striae (very weak in some specimens); scutellar cup raised, long, narrow, rim almost as wide as inner surface of cup. Mesopleural suture distinct, metapleura with weak ridges, anteroventral cavity with minute hairs. Propodeal carinae converging basally, weakly bowed apically, propodeum pubescent medially, with tufts of pubescence on lateral margins. Segment 1 of gaster obscured by a ring of hairs at base of tergite 2, tergite 2 the largest in lateral view, tergites 3–4 partially visible, apex of 2 and visible parts of 3 and 4 finely punctate, hypopygium broad, with subbasal hairs, ventral spine short. Legs normal, mid and hind coxae elongate, swollen basally, shorter than the femora, femora widest apically, shorter than tarsis. Wing surfaces pubescent, with a long apical fringe of hairs on apical margins, radial cell of forewing closed on margin, veins strongly pigmented, *M* and *Rs*+*M* absent. Colour: antenna and legs pale yellow, head, thorax and gaster light orange-yellow (in some specimens apical segments of antenna darker than basal segments).

♂. Antenna 15-segmented, segment 3 shorter than each of following segments, 4th curved and swollen apically (Fig. 264).

MATERIAL EXAMINED

Holotype ♀, **Nigeria**: Ibadan (*B. R. Critchley*) (MRAC).

Paratypes. **Nigeria**: 5 ♀, 4 ♂ same data as holotype (BMNH). **Zaire**: 1 ♀ (MRAC).

REMARKS. This species is not closely related to any of those described in this paper. The fovea on the pronotal plate appear closed but are not well defined.

Rhoptromeris persius sp. n.

(Figs 250, 251, 252)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 longer than 4, 4–6 subequal in length, 7–13 forming a weak club, the segments swollen medially (Fig. 251). Face, viewed frontally, with eyes as far apart measured medially between eyes as height of an eye, sparse scattered hairs extending from outer margins of antennal sockets to clypeus, malar grooves distinct, lower face with scattered hairs. Pronotal plate with a transverse groove between anterior and posterior parts, closed on lateral margins (*cf.* Fig. 250). Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum polished basally, weakly striated laterally, scutellar fovea polished, kidney-shaped, scutellar disc with radiating striae, apex rounded, scutellar cup longer than broad, polished, rim light-coloured, apex of cup with a fovea. Mesopleural suture distinct, metapleura weakly ridged, anteroventral cavity with a distinct tuft of hairs. Propodeal carinae weakly bowed apically, lateral margins pubescent. Segment 1 of gaster in the form of a crescent-shaped ring, crenulate, tergite 2 the largest in lateral view, impunctate, with a ring of pubescence at its base, tergite 3 only just visible, hypopygium not prominent, ventral spine very short. Legs normal, mid and hind coxae swollen basally, longer than broad, trochanters long, femora swollen basally, tibiae widest at apex. Wing surfaces pubescent, margins with a fringe of hairs, radial cell of forewing closed on margin, long, narrow (Fig. 252), veins *M* and *Rs+M* absent. Colour: antenna orange-yellow basally, brownish apically, head and thorax reddish brown, gaster orange-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: 25.vi.1951 (*J. Verschurch*) (MRAC).

REMARKS. Only one specimen of this species has been seen. It is close to *equalis* but separated by the antennal characters, see key.

Rhoptromeris punctata sp. n.

(Figs 239, 246, 248)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 as long as 4+5, segment 4 longer than 5, each more than twice as long as wide, 7–13 forming a distinct club (Fig. 248). Face, viewed frontally, with eyes further apart than height of an eye measured medially, face with a row of hairs extending from outer margins of antenna to clypeus, malar grooves distinct, lower face with scattered hairs. Pronotal plate with two fovea, one either side of medial bridge between anterior and posterior parts of plate, closed on lateral margins (*cf.* Fig. 246). Pronotum either side of plate with sparse hairs. Mesoscutum smooth, polished, notaulices absent, a row of scattered hairs in their place, lateral bars of scutellum smooth, polished, scutellar disc polished, rounded apically, cup narrow, elliptical. Mesopleural suture weak though complete, metapleura with a few weak impressions, anteroventral cavity with a tuft of hairs. Propodeal carinae parallel, pubescent on lateral margins. Segment 1 of gaster in the form of a short crenulate ring, tergite 2 the largest, with a ring of pubescence at base, not complete on dorsal surface, tergites 2–4 of gaster visible in lateral view, visible parts of 3 and 4 punctate, hypopygium weakly protruding, ventral spine short. Legs of normal proportions, coxae weakly swollen basally, femora medially swollen, tibiae broad apically, tarsi short, equal in length to tibiae; femora, tibiae and tarsi with sparse pubescence. Wing surface pubescent, with a long apical fringe of hairs on frontal and apical margins, radial cell of forewing closed on margin, veins thick, cell small (*cf.* Fig. 239), veins *M* and *Rs+M* not indicated. Colour: antenna yellowish, apical segments darker, head, thorax and gaster chestnut-red-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kivu, Sake, v.1938 (*J. Ghesquière*) (MRAC).

Paratypes. **Zaire**: 2 ♀ (MRAC).

REMARKS. Very closely related to *enna* but distinguished by antennal segments 4–6 and the scutellar disc.

Rhoptromeris rufulus sp. n.

(Figs 246, 258, 260)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 longer than 4, 4 longer than 5, 5 subequal to 6, 7–13 forming a club (Fig. 260). Head, viewed frontally, with eyes converging closer together on approach to lower face, face with a line of scattered hairs extending from outer margins of antennal sockets to clypeal area, malar groove distinct, lower face and frontal area with long scattered hairs. Pronotal plate pronounced, anterior and posterior parts connected by a medial bridge with a fovea on either side of bridge, closed on lateral margins (*cf.* Fig. 246); lateral margins of pronotum with a tuft of pubescence either side of plate. Mesoscutum polished, notaulices absent, a row of scattered hairs in their place, anterior parallel lines weakly indicated; lateral bars of scutellum polished, scutellar fovea kidney-shaped, scutellar disc with weak radiating ridges laterally, stronger apically, apex rounded, scutellar cup semi-oval, apex with a small fovea, basal area with minute pits. Mesopleural suture distinct, metapleura weakly ridged, anteroventral cavity with a few hairs. Propodeal carinae weakly bowed, lightly pubescent laterally. Segment 1 of gaster in form of a crenulate ring, partially obscured by a dense ring of hairs at base of tergite 2, tergites 2–3 visible in lateral view, tergite 2 the largest, segment 3 punctate, hypopygium not prominent, ventral spine with subequal hairs, ovipositor short. Legs normal, coxae not noticeably swollen, femora swollen basally, tibiae slender, widest apically, tarsi a little shorter than tibiae. Wing surfaces pubescent, margins with a fringe of hairs, radial cell of forewing closed, veins *M* and *Rs+M* not indicated. Colour: antenna yellow basally, darker apically except for segment 13 yellow, head and thorax dark brown, legs yellow.

♂. Antenna 15-segmented, segment 4 twisted, larger than 3 (Fig. 258).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: 26.xi.1952 (*H. de Saeger*) (MRAC).
Paratypes. **South Africa**: 5 ♀ (BMNH). **Zaire**: 49 ♀, 1 ♂ (MRAC).

REMARKS. This species is distinguished from the closely related *bicolor* by the colour pattern of the antenna (see p. 296). The contrast of the colour pattern varies slightly, and the number of completely yellow apical segments also varies. It is possible that two species are involved.

Rhoptromeris rwanki sp. n.

(Fig. 272)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 shorter than 4, 4 longer than 5, 5 equal in length to 6, segments 7–13 forming a very weak club, each segment swollen medially, with rhinaria (*cf.* Fig. 272). Head, viewed frontally, with eyes further apart measured medially than height of an eye, a row of hairs extending from outer margin of antennal sockets to clypeal area, malar grooves distinct. Pronotal plate with two fovea, one either side of medial bridge connecting anterior and posterior parts. Pronotum either side of plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent. Scutellum rounded apically, lateral bars polished dorsally, scutellar fovea shallow, smooth, polished, lateral margins of scutellar disc with aberrant ridged sculpture, scutellar cup long, narrow, apex with a fovea, with small pits alongside inner margin of cup rim. Mesopleural suture distinct, metapleura polished, anteroventral cavity with a tuft of pubescence. Propodeal carinae weakly bowed medially, densely pubescent medially and laterally. Segment 1 of gaster distinct, a little wider than long, crenulate, tergite 2 the largest in lateral view, remaining segments not visible, base of tergite 2 with a ring of dense pubescence, sparse on dorsal surface, hypopygium not pronounced, ventral spine short, with subbasal hairs. Legs slender, pubescent, mid and hind coxae elongate, weakly swollen basally, femora weakly swollen basally, tibiae slender, broad apically, tarsi normal. Wing surfaces pubescent, with apical hair fringe, forewing rather blunt apically, radial cell of forewing closed on margin, almost as broad medially as long measured medially, veins *M* and *Rs+M* indicated by weak pigmentation. Colour: antenna yellow basally, dark medially, apical 2–3 segments yellowish, head, thorax and gaster dark chestnut-red, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: N. Lac Kivu, Rwanki, 15.ii.1952 (*J. V. Leroy*) (MRAC).
Paratypes. **Zaire**: 8 ♀ (MRAC).

REMARKS. This species is very similar to *cepheus* but the antennae are not white apically and the scutellar disc has weakly ridged sculpture.

Rhoptromeris rutshuris sp. n.

(Figs 236, 275)

DESCRIPTION. ♀. Antenna 13-segmented, filiform, segment 3 shorter than 4, 4 and 5 subequal in length, 6–13 with rhinaria, weakly swollen medially, apical segments white (Fig. 236). Face, viewed frontally, with eyes converging towards clypeus, scattered hairs extending from antennal sockets to clypeal margin, malar grooves and anterior tentorial pits distinct, mandibles pubescent. Pronotal plate, viewed frontally, with lateral margins and dorsal margin straight, posterior and anterior parts fused medially by a narrow medial bridge separating two fovea which are closed on lateral margins (*cf.* Fig. 275). Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum broader than long, polished on dorsal surface, scutellar fovea semi-oval, polished, scutellar disc with weak radiating ridges laterally and apically, apical margin of disc rounded; scutellar cup slightly longer than wide, with a large fovea apically and smaller fovea medially, rim of cup not pronounced. Mesopleural suture distinct, metapleura with distinct ridges, anteroventral cavity with a tuft of pubescence. Mesopleural suture bowed apically, pubescent either side of propodeum. Segment 1 of gaster in the form of a crenulate ring, a little longer than wide, tergite 2 the largest viewed laterally, with a ring of hairs at its base, tergite 3 partially visible, apex of tergite 2 and visible parts of tergite 3 punctate, hypopygium not prominent, ventral spine short. Legs normal, femora swollen in basal two-thirds, tibiae widest apically, as long as femora, shorter than tarsi. Wing surfaces pubescent, with a fringe of hairs on front and apical margins, radial cell of forewing closed on margin, narrow basally, veins *M* and *Rs+M* not indicated. Colour: antenna yellowish basally, brownish medially, apical segments pale yellow, head, thorax and gaster orange-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Rutshura, xi.1937 (*J. Ghesquière*) (MRAC).

Paratypes. **Cameroun**: 2 ♀ (BMNH). **Zaire**: 38 ♀ (MRAC).

REMARKS. Distinguished from the related species *agis* by the punctate segments of the gaster and the white apical segments of the antenna.

Rhoptromeris sinis sp. n.

(Fig. 279)

DESCRIPTION. ♀. Antenna 13-segmented, segments 3–6 subequal in length, 7–13 forming a weak club, each club segment with rhinaria (Fig. 279). Face, viewed frontally, with eyes converging, further apart than height of an eye, face with long sparse hairs scattered in area between antennal sockets and clypeus, malar grooves distinct. Pronotal plate with two laterally closed fovea, one on either side of medial bridge between anterior and posterior parts, outer parts of plate angular, either side of plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent, scattered hairs present; lateral bars of scutellum polished dorsally, scutellar foveae kidney-shaped, polished, scutellar disc rounded apically, surface with weak to strongly radiating sculpture; scutellar cup long, elliptical, apex with a small fovea, the anterior area with transverse striae. Mesopleural suture distinct, metapleura ridged, anteroventral cavity bare. Propodeal carinae parallel, pubescent dorsally and laterally. Segment 1 of gaster broader than long, crenulate, tergite 2 the largest in lateral view, with a ring of dense pubescence at its base, complete on dorsal surface, segment 3 partially visible, gaster weakly punctate though not conspicuously, hypopygium weakly projecting, ventral spine with sparse hairs basally. Legs normal, mid and hind coxae elongate, weakly swollen basally, pubescent medially, femora, tibiae and tarsi subequal in length, femora swollen in basal half, tibiae broader apically than basally, tibiae and tarsi pubescent with a hair fringe along margins. Wing surfaces pubescent, with apical fringe of hairs, radial cell of forewing closed on margin, veins *Rs* longer than 2*r*, veins *M* and *Rs+M* indicated as folds, with a weak trace of pigmentation. Colour: antenna pale yellow basally, darker apically, head, thorax and gaster reddish brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: N. Lac Kivu, Rwanki, 15.ii.1952 (*J. V. Leroy*) (MRAC).

Paratypes. **Cameroun**: 1 ♀ (BMNH). **Zaire**: 17 ♀ (MRAC).

REMARKS. This species is difficult to separate from *bupalus* and *attis*; however, the third antennal segment is equal in length to and not longer than the fourth as in the other species.

Rhoptromeris temesa sp. n.

(Figs 275, 282, 283, 284)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 shorter than 4, 5 a little shorter than 4, 6–13 with rhinaria, the club only discernible by the presence of rhinaria, very weakly swollen medially (Fig. 282).

Head, viewed frontally, with eyes as far apart measured medially as the height of an eye, face with scattered hairs, prominent around malar grooves, clypeus and mandibles. Pronotal plate with two fovea separated by a medial bridge between anterior and posterior parts, with a tuft of pubescence on either side (*cf.* Fig. 275). Mesoscutum smooth, polished, lateral bars polished, scutellar fovea polished, weakly sculptured; scutellar disc with radiating and ridged sculpture apically, apex rounded; scutellar cup large, elongate, broad, apex with a transverse fovea, basal half polished, with weak sculpture, rim of disc with a few long setae (Fig. 283). Mesopleural suture distinct, straight, metapleura polished on upper margins, ridged apically, anteroventral cavity with minute hairs. Propodeal carinae parallel, thick, pubescent laterally. Segment 1 of gaster completely hidden, ring of hairs at base of tergite 2 short and thick, tergite 2 the largest in lateral view, punctate, segments 3 and 4 not visible, hypopygium short, squarish apically, ventral spine short. Legs slender, normal shape, sparsely pubescent. Wing surfaces pubescent, apical margins with a fringe of hairs. Forewing broad apically, radial cell closed on margin, longer than broad (Fig. 284), veins *M* and *Rs+M* not pigmented, visible as folds. Colour: antenna orange-brown basally, apical segments darker, head blackish red, thorax and gaster chestnut-red, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: N. Lac Kivu, Rwanki, 15.ii.1952 (*J. V. Leroy*) (MRAC).

REMARKS. A distinctive species which can be separated from *rutshuris* by the strong radiating sculpture of the scutellar disc and the broad median bridge on the pronotal plate.

Rhoptromeris thales sp. n.

(Figs 228, 265, 266)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 shorter than 4, 4 and 5 equal in length, 6 shorter than 5, 7–13 with rhinaria, each segment wider apically than basally (Fig. 266). Face, viewed frontally, with eyes as close together measured medially as height of an eye, face with sparse hairs between outer margins of antennal sockets and clypeal area, malar grooves and anterior tentorial pits distinct. Pronotal plate with two fovea, one either side of medial bridge between anterior and posterior parts, lateral margins of fovea closed (*cf.* Fig. 228), either side of plate with sparse hairs. Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum polished, scutellar fovea polished, kidney-shaped, wider than long; scutellar disc rounded apically, lateral margins with widely spaced radiating sculpture, apical surface the same; scutellar cup long, narrow, with apical fovea. Mesopleural suture distinct, metapleura weakly ridged, anteroventral cavity with minute hairs. Propodeal carinae bowed medially, propodeum pubescent on dorsal and lateral surfaces. Segment 1 of gaster in the form of a crenulate ring, visible part in the form of a crescent, tergite 2 the largest, base with a dense ring of hairs, tergites 3 and 4 partially visible, gaster impunctate, hypopygium pronounced, ventral spine short. Legs slender, mid and hind coxae elongate, swollen basally, femora swollen basally, tibiae widest apically, longer than femora, slightly longer than tarsi. Wing surfaces pubescent, with apical fringe of hairs, forewing narrow, radial cell elongate, narrow basally, weakly rounded (Fig. 265), closed on margin, veins *M* and *Rs+M* not indicated, folds only present. Colour: antenna yellow basally, apical 7 segments darker, head, thorax and gaster blackish brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kivu, Rutshuru, Lubiriz, 1,285 m, 13.vii.1935 (*G. F. de Witte*) (MRAC).
Paratypes. **South Africa**: 2 ♀ (BMNH). **Zaire**: 8 ♀ (MRAC).

REMARKS. This species can be confused with those having a thread-like antenna, but the length to breadth ratios of the segments are not as great and the club segments are discernible not only by the rhinaria being distinct but by the very weak but apparent clavate form of each segment (Fig. 266).

Rhoptromeris velia sp. n.

(Fig. 250)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 very slightly shorter than 4, almost equal in length, 5 shorter than 4, equal in length to 6, 8–13 subequal in length, swollen medially, with distinct rhinaria. Head, viewed frontally, with eyes converging, further apart measured medially than height of an eye, with a row of hairs extending from outer margin of antennal sockets to clypeal area, anterior tentorial pits and malar grooves distinct. Pronotal plate with a transverse groove medially between anterior and posterior parts of plate, closed on lateral margins (*cf.* Fig. 250). Pronotum either side of plate pubescent. Mesoscutum smooth, polished, notaulices absent. Scutellar fovea transversely long, kidney-shaped, deep, polished; lateral bars of scutellum polished; scutellar disc smooth laterally to weakly reticulate with radiating broken rugose sculpture apically, scutellar cup almost oval, with a wide rim, apex with a small semi-circular fovea, inner margin of rim with a few small fovea or pits. Mesopleural suture distinct, metapleura weakly ridged, anteroventral cavity bare. Propodeal carinae subparallel, weakly converging apically, lateral margins of propodeum with dense tufts of pubescence. Segment 1 of gaster obscured by a ring of dense hairs at base of tergite 2, in the form of a crescent-shaped ring, crenulate; tergite 2 the largest, occupying almost whole of visible lateral area, tergites 3 and 4 only partially visible, gaster impunctate, hypopygium weakly visible, ventral spine short, with sparse subbasal hairs present. Legs slender, mid and hind coxae elongate, swollen medially, femora swollen basally, tibiae widest apically, tarsi longer than tibiae. Wing surfaces pubescent, margins with a fringe of hairs, apex of wings broad, radial cell of forewing closed on margin, veins *M* and *Rs+M* not indicated. Colour: antenna yellowish orange basally, apical segments darker, head, thorax and gaster chestnut-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Cape Province, Mossel Bay, 18–30.ix.1921 (*R. E. Turner*).

Paratypes. **South Africa**: 1 ♀ (BMNH). **Zaire**: 2 ♀ (MRAC).

REMARKS. This species is distinguished from *afer* by the shape of the club segments, which are weakly pronounced, whereas in *afer* the club is sharply defined.

Rhoptromeris zetes sp. n.

(Figs 249, 250)

DESCRIPTION. ♀. Antenna 13-segmented, segments 3–6 subequal in length, 7–13 forming a weak club, each club segment with rhinaria and clearly wider apically than basally. Face, viewed frontally, with eyes weakly converging, further apart measured medially than height of an eye, scattered hairs extending from outer margins of antennal sockets to clypeus. Pronotal plate with a transverse groove between anterior and posterior parts, closed on lateral margins (Fig. 250), lateral margins of pronotum with tufts of pubescence either side of pronotal plate. Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum polished, scutellar disc smooth laterally, ridged apically, apical margin of disc rounded; scutellar cup elongate, narrow apically, rim of cup paler than inner surface, apex with minute fovea. Propodeal carinae parallel, lateral margins of propodeum pubescent. Mesopleural suture distinct, metapleura with complete transverse ridges, anteroventral cavity with a tuft of short hairs. Propodeal carinae subparallel, weakly bowed apically, strongly pubescent laterally. Segment 1 of gaster in the form of a crenulate ring, partially obscured by a ring of short hairs at base of tergite 2, tergite 2 the largest in lateral view, punctate apically, visible parts of tergites 3 and 4 punctate, hypopygium small. Ventral spine short (Fig. 249). Legs normal, mid and hind coxae elongate, coxae swollen basally, shorter than femora, femora widest apically, tarsi longer than tibiae. Wing surfaces pubescent, apical margin with a hair fringe, radial cell of forewing closed, veins *M* and *Rs+M* weakly indicated by pigmentation. Colour: antenna yellow basally, 7–11 brownish, 12–13 light yellow, almost white, head and thorax chestnut-brown, gaster dark orange-yellow, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kivu, Nyongera, near Rutshuri, Butamba, 1,218 m, 17.vii.1935 (*C. F. de Witte*) (MRAC).

Paratypes. **Zaire**: 9 ♀ (MRAC).

REMARKS. This species is similar to *persius* but has fine punctures on tergites 2–4 of the gaster and the apical segments of the antenna are yellowish.

Rhoptromeris zeus sp. n.

(Fig. 229)

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 shorter than 4, 4 longer than 5, 5–7 each progressively shorter than preceding segment, 8–13 with rhinaria, swollen medially (Fig. 229). Face, viewed frontally, with eyes as far apart measured medially than height of an eye, face with a few sparse hairs, malar grooves and anterior tentorial pits distinct. Pronotal plate with a transverse groove medially between anterior and posterior parts, closed on lateral margins, either side of plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum polished, broad basally, scutellar foveae kidney-shaped, scutellar disc polished on lateral margins, apex rounded, apical surface with weak rugae; scutellar cup long, narrow, rim pale, apex with a small fovea. Mesopleural suture distinct, metapleura with weak ridges posteriorly, anteroventral cavity with an excrescence. Propodeal carinae parallel, pubescent on lateral margins. Segment 1 of gaster very slightly longer than broad, petiolate, in the form of a crenulate ring, tergite 2 the largest in lateral view, with a dense ring of hairs at base, not complete on dorsal surface, tergites 3 and 4 partially visible, gaster impunctate, hypopygium pronounced, long, broad apically in lateral view, ventral spine short. Legs normal, mid and hind coxae elongate, swollen medially, femora swollen in basal two-thirds, tibiae longer than femora, widest at apex, tarsi slightly longer than tibiae. Wing surfaces pubescent, with long hair fringe on frontal and apical margins, radial cell of forewing closed on margin, very narrow basally, veins *M* and *Rs+M* weakly indicated by pigmentation. Colour: antenna yellowish basally, becoming yellowish brown apically, head, thorax and gaster orange-brown, legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Massif Ruwenzori, Kalonge, 260 m, Ruiss Karambura, affl. Katauleko, 30.i.–ii.1953 (*P. Vanschuytbroeck & J. Keknbosch*) (MRAC).

Paratypes. **Zaire**: 2 ♀ (MRAC).

REMARKS. Separated from other species by the six-segmented club and the very pronounced hypopygium.

STENTORCEPS Quinlan

Stentorceps Quinlan, 1984: 479. Type-species: *Stentorceps tubicen* Quinlan, by original designation and monotypy.

DIAGNOSIS. ♀ antenna 13-segmented, segment 3 subequal to 4+5, 4 and 5 subequal in length, 7–13 forming a club (Fig. 281), darker than segments 1–6; ♂ antenna 15-segmented, 4th segment grossly swollen (Fig. 288). Head, viewed frontally, with two pyriform protuberances, one each side of face on inner orbits, occupying whole space between the half of area between eyes (Figs 31, 32) except for a medial furrow and a narrow gap between inner margins of protuberances and antenna. Supraclypeal area of face with a large protrusion shaped like the mouth of a trumpet, slightly narrower at its base (Fig. 32), mandibles very long, apically truncate, with scissors-like action (Fig. 289), clypeus long, narrow, with a few sparse setae (Fig. 289). Pronotal plate projected forward, posterior and anterior parts separated medially by a transverse ridge with two shallow foveae, not open on lateral margins. Segments 1–4 of gaster visible in ♀, and 1–6 in ♂, apical segments punctate (Fig. 286).

Stentorceps tubicen Quinlan

(Figs 31, 32, 281, 284, 285, 286, 287, 288, 289)

Stentorceps tubicen Quinlan, 1984: 479. Holotype ♀, KENYA (BMNH) [examined].

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 subequal to 4+5, 4 and 5 subequal in length, 7–13 forming a club (Fig. 281), darker than flagellar segments 1–6. Head, viewed frontally, as broad as long, eyes as far apart measured medially as height of an eye, the two protuberances occupying inner orbits, being separated medially, the trumpet-shaped protrusion on face with outer rim, viewed dorsally, light-coloured, lateral margins with a ring of setae extending past rim (Fig. 31); lower face, mandibles and clypeus with long scattered setae; pronotum either side of pronotal plate with tufts of pubescence. Mesoscutum smooth, polished, notaulices absent, in their place a row of hairs, scutellar foveae smooth, shallow, lateral bars smooth, scutellar disc polished laterally, apex weakly conical, surface with reticulate-rugose sculpture (Fig. 284), scutellar cup long, elliptical, with a large apical fovea. Propodeal carinae parallel, converging apically, lateral margins of propodeum with tufts of pubescence. Mesopleura smooth, polished, mesopleural suture complete, metapleura ridged (Fig. 285), anteroventral cavity with a few minute hairs (Fig. 285), open basally. Segment 1 of gaster in the form of a short strigose ring, partially obscured by a ring of hairs at base of tergite 2, tergite 2 the largest, viewed laterally, ring of hairs at base incomplete on dorsal surface, hypopygium prominent, ovipositor short. Forewing broad, rounded apically, hindwing narrow, wing surfaces densely pubescent, apical margins with a fringe of hairs, radial cell of forewing closed on margin viewed with a Leitz stereo microscope [under the electron microscope it appears open, this is due to the presence of pigmentation (Fig. 287)]. Legs robust, coxae weakly swollen, with scattered pubescence, femora broad medially, margins of mid and hind coxae with a sparse hair fringe, tibiae pubescent, tarsi 5-segmented. Colour: head and thorax blackish brown, gaster chestnut-red basally, otherwise brown, mandibles yellowish, antenna yellow basally, club segments brownish.

♂. Antenna 15-segmented, 4th segment grossly swollen (Fig. 288); segments 3–6 of gaster attached tangentially to tergite 2 (Fig. 286).

MATERIAL EXAMINED

Holotype ♀, **Kenya**: Nairobi, Karen, 6,000m, i.1982–v.1982 (*C. F. Dewhurst*) (BMNH).
Paratypes. **Kenya**: 7 ♀, 5 ♂, same data as holotype (BMNH).

REMARKS. No other species have been seen that can possibly be assigned to this genus.

TRICHOPLASTA Benoit

Trichoplasta Benoit, 1956: 537. Type-species: *Trichoplasta basilewskyi* Benoit, by original designation and monotypy.

DIAGNOSIS. ♀ antenna 13-segmented, pubescent, with a 6–9-segmented club usually darker than basal flagellar segments, segment 3 generally shorter than 4, ♂ antenna 15-segmented, segment 3 shorter than following segments, segment 4 elongate, sometimes swollen distally (Fig. 308). Head, viewed frontally, rounded, frons raised, malar space with a subocular suture with carinae and weak striations on lower side. Pronotal plate similar to that of *Rhoptromeris*, i.e. lateral fovea either side of median bridge between anterior and posterior parts closed (Fig. 300), medial bridge generally narrow. Scutellar disc produced, overhanging propodeum, scutellar cup with a large fovea on lower half. Segment 1 of gaster visible, not obscured by dense woolly ring of pubescence at base of tergite 2, apical segments usually punctate. Wing surfaces densely pubescent, usually narrow, hair margins along apical margins long, radial cell of forewing open or closed on margin, not deep. Segment 1 of gaster visible, not widened at either end, tergite 2 with a dense hairy ring basally, apical segments of gaster generally with dense puncturation (Fig. 334). Legs usually slender.

DISTRIBUTION

World-wide except Neotropical region.

REMARKS. This genus is closely related to *Rhoptromeris* and *Stentorceps* by the form of the pronotal plate being common to all three genera, but is separated by the apomorphic scutellar prolongation.

Key to the Afrotropical species of *Trichoplasta* Benoit

Females

1 Radial cell of forewing open on front margin (Fig. 294); gaster punctate (Fig. 334); ring of pubescence at base of tergite 2 complete on dorsal surface (Fig. 334) 2
– Radial cell of forewing closed on front margin (Fig. 342); gaster impunctate; ring of pubescence at base of tergite 2 not complete on dorsal surface 7

2 Antenna with a 7-segmented club (Fig. 303) 3
– Antenna with 8–9-segmented club (Figs 328, 330) 6

3 Scutellar disc beak-shaped apically, surface punctate-reticulate laterally (Fig. 298), polished apically, long, narrow, scutellar cup large, oval, outer rim pale, lower half of cup with a large circular fovea (Fig. 298); antennal club sharply defined (Fig. 303); pronotum smooth, polished .... ***rufus*** sp. n. (p. 319)
– Scutellar disc beak-shaped or conical, surface reticulate-rugose (Fig. 296); scutellar cup variable in shape, antennal club either sharply or weakly defined 4

4 Antennal club sharply defined (Fig. 296) 5
– Antennal club weakly defined (Fig. 301), antenna short, not as long as distance between front of head and apex of gaster, segment 6 clearly shorter than 7; sides of pronotum polished ***medlia*** sp. n. (p. 317)

5 Antennal segment 3 shorter than 4+5, all segments at least 2·5 × as long as broad; veins *Rs+M* of forewing not indicated; metapleural region weakly crenulate .... ***equalis*** sp. n. (p. 314)
– Antennal segment 3 subequal to 4+5, all segments less than 2 × as long as broad, *Rs+M* distinct; metapleural region strongly ridged (*cf.* Fig. 334) .... ***tanganyikensis*** (Weld) (p. 319)

6 Antennal club 8-segmented (Fig. 330); ventral border of pronotum strongly striated; pronotal plate rounded on margins of posterior plate (Fig. 325) .... ***octonarius*** sp. n. (p. 318)

– Antennal club 9-segmented (Fig. 328); ventral border of pronotum weakly sculptured; pronotal plate angled on margins of posterior plate (Fig. 324), rounded on dorsal margin **novema** sp. n. (p. 318)

7 Antennal segments 7–13 forming a weak 7-segmented club, each segment with rhinaria (Fig. 337).
Scutellar disc tapering almost to a point (beak-shaped) (Fig. 338), reticulate-rugose **bicolor** sp. n. (p. 312)

– Antenna with 5–6-segmented club 8

8 Antennal club 5-segmented 9

– Antennal club 6-segmented 13

9 Apex of scutellar disc not beak-shaped (Fig. 320), surface with radiating sculpture; club segments of antenna sharply defined .... **brevispina** (Masner) (p. 313)

– Apex of scutellar disc extended to form a spine or beak-shaped protrusion (Fig. 335), surface reticulate-rugose; club segments of antenna weakly or sharply defined 10

10 Club segments of antenna sharply defined (Fig. 336) .... **longispina** (Masner) (p. 316)

– Club segments of antenna weakly defined (Fig. 341) 11

11 Antenna completely pale yellow, segments 4–7 subequal in length, club segments very weakly swollen medially, with rhinaria, segment 4 as long or longer than 5 (Fig. 321) 12

– Antenna with club segments yellow-brown, never completely pale (Fig. 341); scutellum beak-shaped (Fig. 339) .... **filiformis** sp. n. (p. 315)

12 Head, thorax and gaster blackish brown; pronotum orange-yellow in sharp contrast; antenna distinctly longer than distance between front of head to apex of gaster; scutellar cup large, oval, scutellar disc rugose, apex acutely spined (Fig. 314); pronotal plate, viewed frontodorsally, with anterior plate angled dorsally, medial bridge narrow (*cf.* Fig. 300) **contrasta** sp. n. (p. 314)

– Head, thorax, gaster and pronotum blackish brown, antenna at most as long as head to apex of gaster, scutellar cup longer than broad, scutellar disc reticulate-rugose, apex of disc sharply but not acutely spined (*cf.* Fig. 338); pronotal plate, viewed frontodorsally, with anterior plate rounded on margins, not angled, medial bridge broad (Fig. 344) .... **quinclava** sp. n. (p. 319)

13 Scutellar disc conical, not spine-shaped at apex 14

– Scutellar disc spine-shaped or in the form of a beak 16

14 Club segments of antenna conspicuous, moniliform (Fig. 306), apical segments twice as long as wide .... **conica** sp. n. (p. 313)

– Club segments of antenna inconspicuous (Fig. 346) 15

15 Antennal segments 3 and 4 subequal in length (Fig. 346) .... **gracilicornis** (Kieffer) (p. 316)

– Antennal segment 3 clearly shorter than 4 (Fig. 358) .... **zeus** sp. n. (p. 321)

16 Antennal segment 3 as long as 4.
Scutellar disc reticulate-rugose (*cf.* Fig. 338); pronotal plate with a broad medial bridge between anterior and posterior parts, posterior part striated (*cf.* Fig. 344) **extensus** sp. n. (p. 315)

– Antennal segment 3 clearly shorter than 4 17

17 Scutellar disc areolate, cup small, with a small declined apical fovea (Fig. 350).
Pronotal plate with a narrow medial bridge between anterior and posterior parts of plate; radial cell of forewing triangular in shape (Fig. 347), head, thorax, gaster and legs orange-yellow .... **testacea** sp. n. (p. 320)

– Scutellar disc rugose-reticulate, scutellar cup large with apical fovea normal, not declined 18

18 Pronotal plate with a very weak bridge medially between anterior and posterior parts (*cf.* Fig. 351); apical segments of antenna dark .... **narrata** sp. n. (p. 317)

– Pronotal plate with a distinct bridge medially between anterior and posterior parts (*cf.* Fig. 344); antenna completely pale yellow .... **unicolora** sp. n. (p. 321)

Males

1 Radial cell of forewing open on front margin (Fig. 294); gaster punctate (Fig. 334), with ring of hairs at base of tergite 2 complete on dorsal surface 2

– Radial cell of forewing closed on front margin (Fig. 342); gaster impunctate, ring of hairs at base of tergite 2 incomplete on dorsal surface 4

2 Pronotum striate on lateral margins (Fig. 295); antennal segment 3 subequal to 4, 4 swollen

distally, curved, strongly flattened medially on outer margin, viewed dorsally (*cf.* Fig. 291); gaster densely punctate .... ***equalis*** sp. n. (p. 314)

– Pronotum polished on lateral margins, antennal segment 3 distinctly shorter than 4 (*cf.* Fig. 317) 3

3 Antennal segment 4 weakly swollen, not curved or flattened medially (Fig. 331); scutellar cup elliptical, longer than broad, scutellar disc reticulate-rugose, apex beak-shaped (Fig. 297) ***medlia*** sp. n. (p. 317)

– Antennal segment 3 subequal to 4, weakly swollen medially, flattened on outer medial margin (Fig. 317); scutellar cup oval, scutellar disc finely reticulate-rugose, apex conical (Fig. 298) ***rufus*** sp. n. (p. 319)

4 Antennal segment 4 2·6 × length of segment 3, with very prominent rhinaria, 4–6 darker than basal segments, narrow basally and apically, weakly swollen medially (Fig. 304); scutellar cup almost oval, scutellar disc with radiating striae below scutellar fovea, apex of disc with a distinct spine .... ***narrata*** sp. n. (p. 317)

– Antennal segment 4 either curved, swollen medially or basally, or twisted, less than 2·3 × length of 3; scutellar disc cone- or spine-shaped, viewed apically, surface reticulate-rugose, exceptionally with radiating striations 5

5 Antennal segment 4 of antenna twisted, flattened on outer margin, swollen apically (sometimes very swollen) (Fig. 308); scutellar disc reticulate-rugose, apex almost pointed (Fig. 307); pronotal plate weakly striated on anterior part (*cf.* Fig. 344) .... ***conica*** sp. n. (p. 313)

– Segment 4 of antenna swollen medially or basally, or if curved not strongly swollen at apex; scutellar disc conical or beak-shaped 6

6 Segment 4 of antenna, viewed laterally, flattened on outer margin, weakly swollen medially, narrow apically and basally (Fig. 311).

Scutellar disc reticulate-rugose laterally, with weak striae, apex with a long narrow blunt spine (Fig. 310); scutellar cup longer than wide .... ***filiformis*** sp. n. (p. 315)

– Segment 4 of antenna swollen basally or curved, or weakly swollen apically; scutellar cup semi-oval 7

7 Antennal segment 4, viewed laterally, swollen basally (Fig. 352); scutellar disc with radiating sculpture, apex with a narrow beak-like protuberance (*cf.* Fig. 350) .... ***unicolora*** sp. n. (p. 321)

– Antennal segment 4 curved, not swollen (Fig. 313); scutellar disc reticulate-rugose, apex conical (Fig. 314) .... ***contrasta*** sp. n. (p. 314)

Trichoplasta bicolor sp. n.

(Figs 337, 338, 344)

DESCRIPTION. ♀. Antenna 13-segmented, very weakly subclavate, the 7-segmented club not sharply defined (Fig. 337), rhinaria visible on all club segments, each club segment weakly swollen medially. Head, viewed frontally, smooth, polished, with long sparse hairs, antennal sockets pronounced, anterior tentorial pits distinct, subocular sulcus distinct, occipital carina weak. Pronotal plate rounded laterally and dorsally on posterior margins, anterior rounded on lateral margin, fovea either side of medial bridge closed on lateral margins (*cf.* Fig. 344), either side of plate with tufts of whitish pubescence. Mesoscutum smooth, polished, lateral bars of scutellum polished dorsally, scutellar fovea shallow, polished; scutellar disc reticulate-rugose, tapering almost to a point (similar to a beak), scutellar cup small, elliptical, with a pale rim, sculptured basally with a large apical fovea on apical third (Fig. 338). Lateral margins of pronotum, mesopleura and metapleura smooth, polished, mesopleural suture distinct, metapleura ridged, pubescent adjacent to hind coxa, nucha ridged, pubescent. Propodeal carinae weakly bowed, obscured by pubescence. Segment 1 of gaster completely obscured by a dense woolly ring of hairs at base of tergite 2, incomplete on dorsal surface, tergite 2 impunctate, remaining tergites not visible in lateral or dorsal view, hypopygium clearly visible. Legs long, slender, coxae elongate, coxae, femora and tibiae pubescent. Wing surface pubescent, with apical hair fringe, radial cell of forewing closed on wing margin, venation pallid, vein *M* (cubitus) not indicated. Colour: head and thorax brownish, gaster chestnut-red, legs orange-yellow, antenna yellow basally, dark apically.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Port St John, Pondoland, 12–30.vi.1923 (*R. E. Turner*) (BMNH).

REMARKS. This species is distinguished by the 7-segmented club (see key).

Trichoplasta brevispina (Masner)

(Figs 318, 320)

Odonteucoila brevispina Masner, 1960: 357. Holotype ♀, KENYA (MRAC) [examined].
Trichoplasta brevispina (Masner) Nordlander, 1982*a*: 273.

DESCRIPTION. ♀. Antenna 13-segmented, with a distinct 5-segmented club, segment 3 shorter than 4, 4 longer than 5, 5 shorter than 6, 5–12 subequal in length, 13 as long as 3, apical 5 segments distinctly broader than preceding segments. Head, viewed frontally, with sparse scattered hairs, antennal sockets pronounced, viewed dorsally, subocular sulcus and malar suture distinct, with striae on either side, occipital carinae pronounced dorsally. Pronotal plate rounded posteriorly, viewed frontodorsally, anterior margins angled laterally, medial bridge between anterior and posterior parts separated by a narrow bridge, fovea either side of bridge closed on lateral margins. Mesoscutum smooth, polished, with widely scattered hairs, notaulices absent; lateral bars of scutellum polished, weakly sculptured; scutellar disc with radiating, ridged rugose sculpture, apex conical, not elongated to form a beak-like projection (Fig. 320), sparse hairs present; scutellar cup small, elliptical, rim pronounced, inner surface depressed, sculptured with a small apical fovea. Pronotum smooth, polished, with pubescence either side of pronotal plate; mesopleural suture distinct, metapleura ridged basally with tufts of hair either side of propodeum. Propodeal carinae parallel, nucha longitudinally ridged, pubescent. Segment 1 of gaster crenulate, base of tergite 2 with a ring of hairs, incomplete on dorsal surface, apex of tergite 2 impunctate, segments 3 and 4 not visible, hypopygium weakly projecting. Legs long, slender, coxae and femora with long sparse hairs. Wings narrow, surfaces pubescent, with apical hair fringe, radial cell of forewing closed on margin (Fig. 318), venation very pallid, vein *M* (cubitus) indicated, not pigmented. Colour: head and thorax brownish black, gaster chestnut-red, legs yellowish, coxa yellowish brown, antenna yellowish, club segments yellowish brown.

♂ unknown.

MATERIAL EXAMINED

Kenya: 1 ♀ (holotype), Molo (Mau Escarpment) 2150–2200 m, 11–12.vi.1957 (*Basilewsky & Leleip*) (MRAC).

Zimbabwe: 1 ♀ (BMNH).

REMARKS. This species is distinguished from *gracilicornis* by the sculpture of the scutellar disc and the shape of the radial cell.

Trichoplasta conica sp. n.

(Figs 300, 306, 307, 308, 312)

DESCRIPTION. ♀. Antenna 13-segmented with a distinct, moniliform, 6-segmented club, segment 3 as long as 4+5, 4 longer than 5, 5 shorter than 6, club segments distinctly wider than preceding flagellar segments (Fig. 306). Head, viewed frontally, with sparse scattered hairs, antennal sockets pronounced, subocular suture (malar suture) distinct, with weak aberrant sculpture on either side, occipital carina distinct, with long hairs on lateral margins. Pronotal plate, viewed frontodorsally, with posterior part with a flattened dorsal margin, laterally rounded, anterior and posterior parts fused by a medial bridge, fovea on either side closed (*cf.* Fig. 300). Mesoscutum smooth, polished, anterior parallel lines indicated, notaulices absent, scattered hairs in their place; lateral bars of scutellum polished, scutellar foveae kidney-shaped; scutellar disc reticulate-rugose, conical at apex, not beak-shaped (Fig. 307), cup elliptical, rim pale, a fovea at base and apex. Pronotum smooth, polished either side of pronotal plate; mesopleural suture distinct, metapleura ridged near junction with hind coxa. Propodeal carinae weakly bowed, strongly pubescent on either side, nucha ridged. Segment 1 of gaster crenulate, partially obscured by a ring of hairs at base of tergite 2, apex of tergite 2 with light punctures, tergites 3–5 partially visible in lateral view, punctate, hypopygium pronounced (Fig. 312). Legs short, coxae and tibiae pubescent. Wings broad, surface pubescent, apical hair fringe long, radial cell closed on wing margins, venation of radial cell strongly pigmented, vein *M* (cubitus) indicated, not pigmented. Colour: head, thorax and gaster dark chestnut-red-brown, legs orange-yellow, antenna yellowish basally, apical segments blackish orange-brown.

♂. Antenna 15-segmented, segments 3–15 with rhinaria, segment 3 shorter than 4, 4 shorter than 5, twisted and swollen apically (Fig. 308).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Mont Hoyo, 1280 m, 7–15.vii.1955 (*P. Vanschuytbroeck*) (MRAC).

Paratypes. **Kenya**: 6 ♀ (BMNH). **Nigeria**: 1 ♀ (BMNH). **Uganda**: 4 ♀ (BMNH). **Zaire**: 153 ♀, 1 ♂ (MRAC).

REMARKS. Like *gracilicornis* this species has a sharply defined 6-segmented club, the apical segments are less than 2 × as long as wide.

Trichoplasta contrasta sp. n.

(Figs 300, 313, 314, 321)

DESCRIPTION. ♀. Antenna 13-segmented, filiform with a very weak 5-segmented club, segment 3 shorter than 4, 4 longer than 5, 5–7 subequal in length, club segments 8–13 with rhinaria (Fig. 321). Head, viewed frontally, with scattered hairs, antennal sockets pronounced, frontal region not raised, malar suture distinct, not pronounced, occipital carina visible dorsally, obscured laterally by dense pubescence either side of pronotal plate. Pronotal plate, viewed dorsally, with anterior margin rectangular, posterior margin rounded, medial bridge between anterior and posterior parts of plate narrow, fovea either side closed laterally (*cf.* Fig. 300). Pronotum smooth, polished laterally (orange in colour), mesopleural suture distinct, metapleura weakly sculptured on lower margin; mesoscutum smooth, polished, with scattered hairs in place of notaulices; lateral bars of scutellum smooth, scutellar foveae kidney-shaped; scutellar cup pear-shaped, with a large fovea apically, scutellar disc reticulate-rugose, apex acute, beak-shaped (Fig. 314). Propodeal carinae parallel, weakly pubescent medially, densely pubescent on lateral margins, nucha ridged. Segment 1 of gaster obscured by a ring of pubescence at base of tergite 2, 3 and 4 visible in lateral view, gaster impunctate, hypopygium not protruding. Legs long, slender, coxae elongate, moderately pubescent. Wings densely pubescent, with apical fringe of hairs, radial cell of forewing closed on wing margin, narrow basally, wide apically, venation dark yellow. Colour: head brownish black, pronotum orange-yellow, mesoscutum and scutellum blackish, gaster chestnut-brown. Legs yellowish orange, antenna yellowish orange.

♂. Antenna 15-segmented, filiform, segment 3 swollen basally, twisted medially (Fig. 313).

MATERIAL EXAMINED

Holotype ♀, **Nigeria**: Ondu State, 21.iii.1971 (*J. T. Medler*) (BMNH).
Paratypes. **Zaire**: 16 ♀, 5 ♂ (MRAC).

REMARKS. This species is closely related to *quinclava* but is distinguished by the contrasting colour pattern of the head, pronotum and scutellum, and the shape of the pronotal plate (*cf.* Fig. 300).

Trichoplasta equalis sp. n.

(Figs 291, 292, 296, 300)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, segment 3 longer than 4, 4 longer than 5, 5 shorter than 6, 7–13 forming a distinct club (Fig. 296). Head, viewed frontally, with strong frontal ridges in part, subocular sulcus distinct, antennal sockets protruding, occipital carina pronounced. Pronotal plate with anterior and posterior fused laterally and medially with a small fovea either side of medial bridge, plate, viewed fronto-dorsally, with anterior rounded laterally (*cf.* Fig. 300), posterior transversely striated. Pronotum either side of pronotal plate pubescent, with transverse striations extending to mesopleura, mesopleural suture distinct; metapleura with crenulate ridges, anteroventral cavity pubescent, side of metapleura adjacent to nucha densely pubescent; mesoscutum smooth, polished, notaulices absent; scutellar foveae kidney-shaped, smooth, lateral bars of scutellum smooth, polished, septum broad; scutellar disc reticulate-punctate, apex beak-shaped (*cf.* Fig. 292), scutellar cup large, almost round, viewed laterally, elevated, apical half with a large fovea; propodeal carinae parallel, weakly pubescent medially, more densely pubescent on lateral margins; nucha ridged, pubescent; base of metapleura pubescent. Segment 1 of gaster not visible, obscured by a dense ring of pubescence at base of tergite 2, apical two-thirds of tergite 2 punctate, tergites 3 and 4 visible in lateral view, punctate; hypopygium not produced. Legs moderate to short, coxae swollen, elongate, sparsely pubescent. Wing surfaces pubescent, with apical fringe of hairs, radial cell of forewing open on wing margin, deep, not elongate, venation dark yellow, vein *M* (cubitus) extending almost to apex of wing. Colour: head and thorax blackish, gaster reddish yellow, antenna blackish brown, legs orange-yellow.

♂. Antenna 15-segmented, segment 3 shorter than 5 which is curved and swollen distally, flattened on outer side, viewed dorsally (*cf.* Fig. 291).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Tshamugussa (Beweza) Bambous, 10.viii.1934 (*G. F. de Witte*) (MRAC).
Paratypes. **Nigeria**: 1 ♂ (BMNH). **Zaire**: 36 ♀, 26 ♂ (MRAC).

REMARKS. Distinguished from the closely related *tanganyikensis* by the antennal and sculptural characters, see p. 320.

Trichoplasta extensus sp. n.

(Figs 338, 344, 348)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, with a distinct 6-segmented club, segments 3–5 subequal, segments 8–13 with rhinaria forming a club, each segment clearly broader than apical segments. Head, viewed frontally, elongate, face smooth, polished, with long scattered hairs, subocular suture or sulcus distinct, antennal sockets weakly protruding. Occipital carina pronounced in dorsal view, obscured laterally by tufts of pubescence either side of pronotal plate. Posterior part of pronotal plate, viewed dorsally, straight, rounded laterally, anterior half diverging outwards, both parts joined laterally and medially to enclose two foveae (*cf.* Fig. 344). Mesoscutum smooth, polished, with a few hairs in place of notaulices; lateral bars of scutellum polished in dorsal view, scutellar foveae angular, polished; scutellar disc reticulate-rugose, converging apically to form a spine or beak-shaped apex (*cf.* Fig. 338). Pronotum and mesopleura smooth, polished; mesopleural suture distinct, metapleura with traces of ridges on lower edge, with sparse hair tufts. Propodeal carinae parallel, weakly pubescent medially, denser on outer margins of carinae, nucha ridged, pubescent. Segment 1 of gaster visible, crenulate, partially obscured by a ring of hairs at base of tergite 2, tergites 3 and 4 not visible in lateral view, gaster impunctate, hypopygium small, not projected. Legs long, slender, coxae with lateral fringe of hairs, femora, tibiae and tarsi pubescent. Wing surfaces pubescent, with apical fringe of hairs, radial cell of forewing closed on wing margin, short, broad (Fig. 348). Colour: head and thorax blackish brown, gaster chestnut-brown, legs orange-yellow, antenna yellowish orange basally, apical segments darkened.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Secteur Tshiaberimu, Mont Kitwa, 2840 m, 29.viii.–7.ix.1953 (*P. Vanschuytbroeck & V. Hendrickx*) (MRAC).

REMARKS. Separated from *narrata* by the pronotal plate character and the antennal segment ratios.

Trichoplasta filiformis sp. n.

(Figs 309, 310, 311, 339)

DESCRIPTION. ♀. Antenna 13-segmented, filiform, with indistinct 5-segmented club, segment 3 shorter than 4, 9–13 with rhinaria, forming a very weak club (Fig. 309). Head, viewed frontally, with frons raised, area above clypeus with long scattered hairs, antennal sockets protruding, subocular sulcus distinct. Occipital carina pronounced medially, fading laterally. Pronotal plate rounded on dorsal margin, angular on lateral margin, fovea on either side of medial bridge enclosed laterally, i.e. posterior and anterior parts joined laterally (*cf.* Fig. 324). Pronotum pubescent on either side of pronotal plate, not striated; mesopleural suture distinct, ventral margin of mesopleura pubescent, metapleura pubescent on apical margin; mesoscutum smooth, polished, notaulices absent, a few scattered hairs in their place; lateral bars of scutellum polished, scutellar fovea smooth, polished, scutellar disc reticulate-rugose, conical to beak-shaped viewed dorsally (Figs 310, 339), scutellar cup longer than broad. Propodeal carinae parallel, pubescent on either side, nucha ridged. Segment 1 of gaster obscured by a ring of pubescence at base of tergite 2, ring incomplete on dorsal surface, tergite 2 impunctate, smooth, polished, hypopygium protruding. Legs long, slender. Wing surfaces pubescent, with apical hair fringe, radial cell of forewing closed on wing margin, vein *M* (cubitus) not indicated. Colour: head, thorax and gaster orange-brown, antenna yellow basally, apical segments brownish black, legs yellow.

♂. Antenna 15-segmented, segment 4 the largest, curved, weakly swollen medially (Fig. 311).

MATERIAL EXAMINED

Holotype ♀, **South Africa**: E. Cape Province, Katberg, 19–22.ii.1924 (*R. E. Turner*) (BMNH).
Paratypes. **South Africa**: 1 ♀ (BMNH). **Zaire**: 13 ♀, 15 ♂ (MRAC).

REMARKS. Separated from closely related species by the colour pattern of the antenna and the ratio of the lengths of segments 3 and 4.

Trichoplasta gracilicornis (Kieffer)

(Figs 344, 346)

Coneucoela gracilicornis Kieffer, 1910*a*: 534. Holotype ♀, MADAGASCAR (ZM).
Odonteucoila gracilicornis (Kieffer) Weld, 1944: 63; Masner, 1960: 356 (redescribed).
Trichoplasta gracilicornis (Kieffer) Nordlander, 1982*a*: 272.

DESCRIPTION. ♀. Antenna 13-segmented filiform, club 6-segmented, segments 3 and 4 subequal in length, 5 shorter than 4, segments 6–11 each subequal to 3, subequal to each other, 12 and 13 each fractionally shorter than 6, equal to 3, club segments very slightly wider than preceding segments, not forming a distinct club (Fig. 346). Head, viewed frontally, smooth, polished, subocular suture distinct, antennal sockets pronounced, frons weakly raised, occipital carina distinct in dorsal view. Pronotal plate, viewed fronto-dorsally, weakly rounded on posterior margin, lateral margins straight, diverging, posterior and anterior parts of plate bridged laterally and medially to enclose two foveae or pits (*cf.* Fig. 344), anterior area striated. Mesoscutum smooth, polished, with a few scattered hairs, lateral lines (parapsidial furrows) very weakly indicated apically; lateral bars of scutellum polished dorsally, scutellar foveae shallow, lenticular, scutellar disc reticulate-rugose, conical at apex, not spine- or beak-shaped, scutellar cup large, almost oval, with a pale rim, inner margins of rim with a circle of small punctures, surface of cup weakly striated basally, base of cup with a small eliptical fovea. Pronotum, viewed laterally, smooth, shining; mesopleural suture distinct, metapleura polished. Propodeal carina almost parallel, bowed medially, lateral margins densely pubescent, weakly pubescent medially; nucha ridged, pubescent. Segment 1 of gaster partially obscured by a dense ring of hairs at base of tergite 2, visible part of tergite 1 crenulate. Segment 2 of gaster the largest in lateral view, segments 3 and 4 partially visible in lateral view, hypopygium produced. Wing surfaces pubescent, with apical hair fringe, radial cell of forewing closed on wing margin, vein *M* (cubitus) indicated, not pigmented. Colour: head, thorax and gaster chestnut-brown, legs yellowish orange, antenna yellowish basally, apical segments darker.

♂ unknown.

MATERIAL EXAMINED

South Africa: 1 ♀ (BMNH). **Zaire**: 4 ♀ (MRAC).

REMARKS. This species was intended as the basis for the erection of the genus *Coneucoela* Kieffer, 1910*a*, but was published subsequent to the description of *Coneucoela brasiliensis* Kieffer, 1909. Thus *brasiliensis* is the type-species of *Coneucoela*. Nordlander (1982*a*) transferred *gracilicornis* to *Trichoplasta*. I have not been able to see the holotype of *gracilicornis* but have used Masner's keys (1960) to *Odonteucoila*, the redescription of *gracilicornis*, and Kieffer's original description to identify the material listed above on which the figures are based.

Trichoplasta longispina (Masner)

(Figs 300, 335, 336)

Odonteucoila longispina Masner, 1960: 358. Holotype ♀, SOUTH AFRICA (NCISA).
Trichoplasta longispina (Masner) Nordlander, 1982*a*: 273.

DESCRIPTION. ♀. Antenna 13-segmented, with distinct 5-segmented club, segment 3 shorter than 4, 4–6 subequal in length, equal in width, 7–10 equal in length, 11 and 12 equal in length, each shorter than 6, 13 as long as 10 (Fig. 336). Head, viewed frontally, smooth, polished, with sparse hairs, frons raised, subocular sulcus distinct; pronotum polished laterally. Pronotal plate, viewed fronto-dorsally, straight on posterior margin, angled laterally, anterior and posterior parts of plate joined by a medial bridge, fovea on either side of bridge enclosed laterally (*cf.* Fig. 300). Mesoscutum smooth, polished, with a few scattered hairs; lateral bars of scutellum smooth, polished dorsally; scutellar foveae lenticular, scutellar disc with radiating reticulate-rugose, apex acute, spine-shaped, scutellar cup large, almost oval, surface raised medially, with a pale outer rim, base with a small elliptical fovea (Fig. 335). Mesopleural suture distinct, metapleura polished, ridged near juncture with hind coxa. Propodeal carinae weakly bowed, pubescent on outer margins. Segment 1 of gaster sulcate, partially obscured by a ring of hairs at base of tergite 2, complete on dorsal surface though weak, tergite 3 partially visible, hypopygium weakly protruding, gaster impunctate. Legs long, pubescent, mid and hind coxae elongate. Wing surfaces pubescent, with apical hair fringe, radial cell closed on wing margin, vein *M* (cubitus) not indicated. Colour: head brownish, thorax and gaster dark chestnut-red, legs yellowish orange, antenna yellowish orange basally, apical segments darker.

♂. Not seen, described by Masner (1960).

MATERIAL EXAMINED

Zaire: 1 ♀ (MRAC).

REMARKS. I have not seen determined material of this species, but the specimen from Zaire referred to above compares well with Masner's description and figures (1960). The species is included in the key purely on the basis of the description, but the figures are based on the specimen from Zaire.

Trichoplasta medlia sp. n.

(Figs 297, 300, 301, 331)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, segment 3 longer than 4, 4 and 5 subequal, 6 longer than 5, 7–13 forming a weak club (Fig. 301). Head, viewed frontally, smooth, polished, elongate, subocular sulcus distinct, antennal sockets protruding, ocelli equidistant, occipital carina distinct. Pronotal plate with anterior and posterior parts fused laterally, medial bridge narrow, fovea either side of ridge elongate, posterior part of plate, viewed frontally, angular, anterior part projected, with weak transverse striations (Fig. 300); pronotum either side of pronotal plate with dense tufts of hair. Pronotum smooth, polished laterally; meopleural suture distinct, metapleura with a number of ridges; mesoscutum smooth, polished, without trace of notaulices; scutellar fovea large, polished; lateral bars of scutellum polished; scutellar disc coarsely reticulate-rugose, apex beak-shaped, viewed laterally it appears elevated; scutellar cup large, oval (Fig. 297), concave in apical region. Propodeal carinae almost parallel, medial area weakly pubescent, densely pubescent on outer margins of carinae, nucha ridged, base of metapleura with tufts of pubescence. Segment 1 of gaster not visible, obscured by a dense ring of hairs at base of tergite 2, complete on dorsal surface, tergite 2 densely punctate apically, segment 3 partially visible in lateral view, punctate, hypopygium not protruding. Legs short, stout, coxae swollen, elongate, with a fringe of hairs on side margins. Wing surfaces pubescent, with apical fringe of hairs, radial cell of forewing closed on margin, venation pallid, cell longer than broad (Fig. 299). Colour: head, thorax and gaster blackish to dark chestnut-red, antenna and legs reddish yellow.

♂. Antenna 15-segmented, filiform, segment 3 shorter than 4, 4 weakly swollen medially, very slightly longer than 5 (Fig. 331).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Uele, Monga, 18.iv.–8.v.1935 (*G. F. de Witte*) (MRAC).

Paratypes. **Nigeria**: 1 ♀, 1 ♂ (BMNH). **Zaire**: 8 ♀, 4 ♂ (MRAC).

REMARKS. This species is very closely related to *rufus* but is distinguished by the sculpture of the scutellar disc and the antennal segment ratios.

Trichoplasta narrata sp. n.

(Figs 304, 305, 324)

DESCRIPTION. ♀. Antenna 13-segmented, weakly clavate, with indistinct 6-segmented club, club segments with rhinaria, segment 3 shorter than 4, 4 longer than 5, 5 and 6 subequal, 7 shorter than 6, 8–13 subequal in length, each as long as 7, weakly swollen medially (Fig. 305), darker than basal segments. Head, viewed frontally, smooth, polished, antennal sockets protruding, subocular sulcus distinct, occipital carina well defined. Pronotal plate, viewed frontodorsally, with typically enclosed fovea either side of medial bridge between anterior and posterior parts of plate (*cf.* Fig. 324), posterior part of plate rounded dorsally, anterior part angled laterally. Pronotum either side of plate with tufts of pubescence. Mesoscutum smooth, polished; lateral bars of scutellum smooth, polished, scutellar fovea deep, clearly separated, polished; scutellar disc reticulate-rugose, apex beak-like, acutely pointed, cup large, with apical fovea. Mesopleural suture very fine, metapleura polished, weakly ridged, with a tuft of pubescence on anterior margin, nucha ridged, with long scattered pubescence. Segment 1 of gaster crenulate, partially obscured by a ring of pubescence at base of tergite 2 which is impunctate, remaining tergites not visible in lateral view, hypopygium pronounced. Legs slender, coxae with a hair fringe on outer margins. Wing surfaces pubescent, with long apical hair fringe, radial cell of forewing closed on wing margin, vein *M* (cubitus) indicated, not pigmented. Colour: head brownish, thorax and gaster orange-brown, antenna yellow basally, apical segments brownish.

♂. Antenna 15-segmented, segment 3 twisted medially, not swollen (Fig. 304).

MATERIAL EXAMINED

Holotype ♀, **Uganda**: Kawanda, x.1942 (*H. C. Taylor*) (BMNH).

Paratypes. **Uganda**: 1 ♀, 1 ♂, same data as holotype (BMNH). **Zaire**: 1 ♂ (MRAC).

REMARKS. This species is very closely related to *unicolora* but can be separated by the shape and form of the pronotal plate.

Trichoplasta novema sp. n.

(Figs 324, 328, 332, 333)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, segment 3 longer than 4, 4 shorter than 5, 5–13 forming a very distinct club (Fig. 328). Head, viewed frontally, smooth, polished, frons raised, with distinct lateral margins extending from raised antennal sockets, subocular sulcus (malar suture) distinct, with weak ridges on either side, occipital carina pronounced dorsally. Pronotal plate, viewed frontodorsally, weakly rounded, lateral margins more angular, anterior and posterior parts fused medially and laterally to enclose a fovea on either side of medial bridge, medial bridge narrow, fovea elongate, distinct, anterior part of plate weakly sculptured (Fig. 324). Pronotum pubescent either side of pronotal plate with a few canaliculations on lower lateral margins. Mesopleural suture distinct, metapleura ridged on lower margins (Fig. 334). Mesoscutum smooth, polished, notaulices absent; scutellar foveae kidney-shaped, lateral bars of scutellum with weak aberrant sculpture apically, scutellar disc with punctate-reticulate-rugose sculpture (Fig. 332), apex conical, scutellar cup large, almost circular, with a round fovea apically (Fig. 332). Propodeal carinae horseshoe-shaped, weakly pubescent medially, densely pubescent on lateral margins, nucha pubescent. Segment 1 of gaster obscured by a ring of dense pubescence at base of tergite 2 which is very weakly punctate apically, segment 3 partially visible in lateral view, hypopygium weakly produced. Legs slender, coxae narrow, sparsely pubescent. Wing surfaces pubescent, with apical hair fringe, radial cell of forewing elongate, open on wing margin, venation yellowish, vein *M* (cubitus) indicated, weakly pigmented basally (Fig. 333). Colour: head and thorax blackish, gaster chestnut-brown, antenna blackish brown, except basal segments lighter.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Uganda**: Butandiga, xii.1938 (*H. C. Taylor*) (BMNH).

Paratypes. **Uganda**: 1 ♀, same data as holotype (BMNH). **Zaire**: 2 ♀ (MRAC).

REMARKS. This species is very similar to *octonius* but has a 9-segmented antennal club, a weakly sculptured pronotum and the pronotal plate is angular (Fig. 324).

Trichoplasta octonarius sp. n.

(Figs 354, 355, 356)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, segment 3 longer than 4, 4 and 5 subequal, 6–13 forming a distinct club (Fig. 354). Head, viewed frontally, smooth, polished, frontal ridges prominent in proximity to antennal sockets which protrude, occipital carina pronounced, subocular suture distinct. Pronotal plate with anterior and posterior parts fused medially and laterally to enclose a fovea either side of medial bridge, medial bridge narrow, posterior part of plate rounded, anterior part angular on lower margins, anterior part smooth, polished. Pronotum viewed laterally pubescent either side of pronotal plate, with strong transverse striations extending to mesopleura. Mesopleural suture distinct, metapleura with five ridges. Mesoscutum smooth, polished, without trace of notaulices; scutellar foveae large, polished, with a hole in basal corner ending under lateral bars of scutellum which are polished; scutellar disc reticulate-rugose, apex conical, scutellar cup large, almost round, basal half with weak striations, apical half with a large fovea (Fig. 356). Propodeal carina broad, parallel, densely pubescent; nucha ridged; margin of metapleura pubescent. Segment 1 of gaster not visible, obscured by a ring of dense pubescence at base of tergite 2, apical two-thirds of tergite 2 punctate, tergites 3 and 4 visible laterally, hypopygium strongly produced. Legs short, coxae swollen, elongate, sparsely pubescent. Wing surfaces pubescent, with apical hair fringe, radial cell of forewing open on wing margin, longer than broad, venation pale, vein *M* (cubitus) visible, not pigmented (Fig. 355). Colour: head, thorax and gaster blackish, antenna orange-yellow basally, darker apically, legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Congo de Lemba, i.1913 (*R. Mayne*) (MRAC).

REMARKS. Closely related to *novema* but distinguished by the 8-segmented club and the laterally striate pronotum.

Trichoplasta quinclava sp. n.

(Figs 314, 342, 343, 344)

DESCRIPTION. ♀. Antenna 13-segmented, filiform, with weak 5-segmented club, segment 3 shorter than 4, 4–7 subequal in length, 8 and 9 subequal, each shorter than 7, 10–13 each slightly shorter than 9 (Fig. 343). Head, viewed frontally, smooth, polished, with long scattered hairs, cheeks converging, antennal sockets protruding, frons raised, subocular sulcus distinct, occipital carina distinct on dorsal margin, obscured by tufts of pubescence either side of pronotal plate which, viewed frontodorsally, is rounded posteriorly. Pronotal plate with anterior and posterior parts fused medially and laterally to enclose a fovea either side of medial bridge (Fig. 344). Pronotum smooth, polished laterally. Mesopleural suture distinct, metapleura strongly ridged basally, with tufts of hair either side of propodeum. Mesoscutum smooth, polished, notaulices absent, a few long hairs in their place; lateral bars of scutellum smooth, polished; scutellar foveae polished, kidney-shaped; scutellar disc reticulate-rugose, apex narrowing sharply to form a beak-shaped apex, scutellar cup elliptical (*cf.* Fig. 314). Propodeal carinae bowed medially, densely pubescent on outer margins; nucha ridged. Segment 1 of gaster crenulate, tergite 2 with a ring of hairs at its base, incomplete on dorsal surface, tergite 3 weakly protruding, hypopygium obscure, gaster impunctate. Legs short, stout, coxae elongate, with sparse hairs apically. Wings pubescent, with apical hair fringe, radial cell of forewing closed on wing margin, vein *M* (cubitus) indicated basally, not pigmented (Fig. 342). Colour: head and thorax blackish brown, legs orange-yellow, antenna yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: N. Lac Kivu, Rwanki, 15.ii.1952 (*J. V. Leroy*) (MRAC).
Paratypes. **Zaire**: 3 ♀ (MRAC).

REMARKS. This species is separated from *contrasta* by the antennal coloration and the shape of the pronotal plate. The antennal club is not sharply contrasted to the basal flagellar segments but all club segments have rhinaria.

Trichoplasta rufus sp. n.

(Figs 298, 302, 303, 315, 317)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, segment 3 longer than 4, 4 longer than 5, 6 longer than 5, 7–13 forming a club (Fig. 303). Head, viewed frontally, elongate, smooth, polished, subocular sulcus distinct, occipital carina distinct, ocelli weakly elevated, equidistant, antennal sockets protruding, mandibles tridentate, sparsely pubescent. Pronotal plate with anterior and posterior parts fused medially and laterally to enclose a fovea either side of medial bridge (Fig. 302). Pronotum either side of pronotal plate smooth, polished, with scattered hairs. Mesoscutum polished, without trace of notaulices; scutellar disc punctate-reticulate, apex beak-shaped (Fig. 298); scutellar cup almost oval, with a basal fovea, viewed laterally, elevated; scutellar foveae shallow, polished, separated by a weak septum; lateral bars of scutellum polished; propodeal carinae almost parallel, densely pubescent medially and laterally. Mesopleural carinae distinct, metapleura polished, with a few crenulations at juncture with coxa; nucha ridged, pubescent. Segment 1 of gaster not visible, obscured by a ring of dense pubescence at base of tergite 2, complete on dorsal surface, apex of tergite 2 with sparse scattered punctures, hypopygium weakly protruding. Legs stout, short, coxae elongate, pubescent, with a fringe of hairs. Wing surfaces densely pubescent, with apical hair fringe, radial cell of forewing open on wing margin, longer than broad (Fig. 315). Colour: head, thorax and gaster reddish brown, antenna and legs reddish yellow.

♂. Antenna 15-segmented, filiform, segment 3 shorter than 4, 4 flattened on outer margins (Fig. 317).

MATERIAL EXAMINED

Holotype ♀, **Madagascar**: Mandraka, ii.1944 (*A. Seyrig*) (MRAC).
Paratype. **Madagascar**: 3 ♂, same data as holotype (MRAC). **Zaire**: 1 ♀ (MRAC).

Trichoplasta tanganyikensis (Weld)

(Figs 292, 293, 324, 329)

Coneucoela tanganyikensis Weld, 1944: 63. Holotype ♀, TANZANIA (USNM) [examined].
Trichoplasta basilewskyi Benoit, 1956: 538. Holotype ♀, RWANDA (MRAC) [examined].
[Synonymy by Nordlander, 1982*a*: 272.]
Trichoplasta tanganyikensis (Weld) Nordlander, 1982*a*: 272.

DESCRIPTION. ♀. Antenna 13-segmented, segment 3 subequal to 4+5, 6 longer than 4 or 5, 7–13 subequal in length, all distinctly wider than preceding flagellar segments and forming a sharply defined club (Fig. 329). Head, viewed frontally, smooth, shining, rounded, frons raised, eyes same distance apart as height of an eye, malar space with a carina and weak striations on lower side, vertex smooth, shining. Pronotum either side of pronotal plate with tufts of pubescence. Pronotal plate produced, anterior and posterior parts fused laterally, medial bridge between both parts narrow (*cf.* Fig. 324), fovea either side of bridge wider than long. Mesopleural suture distinct, metapleura ridged. Mesoscutum smooth, polished, notaulices represented by a row of hairs; scutellar foveae large, smooth, shining; scutellar disc reticulate-rugose, apex conical, extending out over propodeum, scutellar cup large, a little longer than wide, apical quarter with a large fovea, lateral margins of cup with a line of small foveae or pits (Fig. 292); lateral bars of scutellum smooth and polished on dorsal surface; propodeal carinae bowed medially, pubescent on outer margins of carinae, less so medially. Segment 1 of gaster rugulose though obscured by a ring of dense pubescence at base of tergite 2, complete on dorsal surface, apical half of tergite 2 and visible parts of tergites 3 and 4 strongly punctate (Fig. 293), hypopygium strongly protruding. Wing surfaces densely pubescent, with apical fringe of hairs, radial cell of forewing open on wing margin, vein *M* (cubitus) weakly indicated in part, apex of wing rounded. Legs short, stout, coxae swollen medially, tibiae and tarsi pubescent. Colour: antenna yellowish black, head and thorax black, gaster chestnut reddish brown, legs reddish brown.

♂. Antenna 15-segmented, segment 3 shorter than 4, outer margin flattened, segment 4 longer than following segments, swollen distally, flattened medially.

MATERIAL EXAMINED

Holotype ♀ (*tanganyikensis*), **Tanganyika**: Mutresa, 21.ix.1935 (*F. Bianchi*) (USNM, cat.No. 56814). Holotype ♀ (*basilewskyi*), **Rwanda**: Contrefort est du Muhavara, 2100 m, 28.i.1953 (*P. Basilewsky*) (MRAC).

Zaire: 1 ♀, Mt Sesero, near Bitashrmva (Bombous), 2000 m, 1–2.viii.1934 (*G. F. de Witte*) (MRAC). **Cameroun**: 1 ♀ (BMNH).

REMARKS. *Trichoplasta tanganyikensis* (Weld) was originally assigned to *Coneucoela*. Benoit (1956) established the genus *Trichoplasta* and designated *basilewskyi* as type-species. Nordlander (1982*a*) synonymised both species. Masner (1960) and Nordlander (1978*a*, 1980) had previously regarded *Odonteucoila* a genus in which Masner had described a number of species now recognised as belonging in *Trichoplasta* as being closely related to *Rhoptromeris*. The type-species of *Odonteucoila*, however, belongs to those groups of genera with the lateral cavities of the pronotal plate open.

Trichoplasta testacea sp. n.

(Figs 347, 349, 350, 351)

DESCRIPTION. ♀. Antenna 13-segmented, clavate, with a 6-segmented club, segment 3 shorter than 4, 4 longer than 5, 5 shorter than 6, first club segment slightly less broad than others (Fig. 349), all with rhinaria. Head, viewed frontally, smooth, polished, with a line of hairs extending from base of clypeus to antennal sockets, subocular sulcus present, occipital carina distinct viewed dorsally. Pronotal plate, viewed frontodorsally, with two foveae, one each side of medial bridge between anterior and posterior parts of plate, fovea closed laterally, sides of plate angular (Fig. 351), pronotum either side of plate with dense tufts of pubescence. Mesoscutum smooth, polished, notaulices very weakly indicated anteriorly by a few scattered hairs in their place; lateral bars of scutellum very weakly indicated; scutellar foveae kidney-shaped, smooth, polished; scutellar disc shining, weakly areolate, apex sharply tapered, scutellar cup long, narrow, apex with a small declined fovea (Fig. 350). Pronotum smooth on lateral margins; mesopleural suture distinct, metapleura smooth, pubescent on anterior margins; nucha ridged. Segment 1 of gaster obscured by a ring of hairs at base of tergite 2, incomplete on dorsal surface, apex of tergite 2 impunctate, tergite 3 partially visible, hypopygium pronounced. Legs long, slender, coxae and tibiae weakly pubescent. Wing surfaces pubescent, apical margins with a hair fringe, radial cell of forewing closed on wing margin (Fig. 347), vein *M* (cubitus) not indicated. Colour: head, thorax, gaster and legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Nigeria**: Ibadan (*B. R. Critchley*).

REMARKS. This species is completely orange-yellow and differs from others by the scutellar cup which has a declined fovea apically (Fig. 350).

Trichoplasta unicolora sp. n.

(Figs 319, 320, 351, 352)

DESCRIPTION. ♀. Antenna 13-segmented, weakly clavate, with a 6-segmented club, segment 3 shorter than 4, 5–10 subequal in length, segments 8–13 broader medially than segments 3–7 (Fig. 319). Head, viewed frontally, smooth, polished, with long scattered hairs on frons and close to clypeal area, sutures weakly present below antenna, antennal sockets not prominent, anterior tentorial pits distinct; occipital carina distinct dorsally, obscured laterally by tufts of pubescence on either side of pronotal plate. Pronotal plate appearing rectangular viewed frontodorsally, anterior and posterior parts bridged medially and laterally to enclose two pits, one on either side of medial bridge, medial bridge broad (*cf.* Fig. 351). Mesoscutum smooth, polished, with a few long hairs in place of notaulices; scutellar foveae shallow, weakly separated, polished; scutellar disc reticulate-rugose, tapered to form a blunt point apically; lateral bars of scutellum polished dorsally; scutellar cup oval, with a pale rim, centre raised, polished, with small pits or foveae around rim (*cf.* Fig. 320). Lateral margins of pronotum, mesopleura and metapleura polished. Mesopleural suture distinct, metapleura with weak ridges, lower edges with tufts of hairs. Propodeal carinae parallel, weakly pubescent; nucha ridged, pubescent. Segment 1 of gaster crenulate, partially obscured by a ring of pubescence at base of tergite 2, incomplete on dorsal surface, gaster impunctate, hypopygium not pronounced. Legs long, slender, pubescent, coxae elongate. Wings narrow, surfaces pubescent, with apical hair fringe, radial cell of forewing closed on wing margin, vein *M* (cubitus) not indicated, venation weakly pigmented. Colour: head light brown, thorax and gaster orange-brown, legs yellow, antenna pale yellow.

♂ antenna 15-segmented, segment 4 curved medially, swollen basally (Fig. 352).

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Rutshuru, xii.1937 (*J. Ghesquière*) (MRAC).

Paratypes. **Zaire**: 9 ♀, 6 ♂ (MRAC).

REMARKS. Closely related to *narrata* but separated by the form of the pronotal plate and the completely pale antenna.

Trichoplasta zeus sp. n.

(Figs 344, 356, 358)

DESCRIPTION. ♀. Antenna 13-segmented, very weakly clavate, segment 3 shorter than 4, 5–13 each shorter than 4, 4–6 subequal in length and width, 7–13 with rhinaria, weakly swollen medially, subequal in length, forming a 6-segmented club (Fig. 358). Head, viewed frontally, smooth, polished, with scattered hairs extending from antennal region to clypeus, anterior tentorial pits distinct, subocular sulcus fine but distinct, antennal sockets weakly protruding, occipital carinae, viewed dorsally, not conspicuous, head, viewed dorsally, with hind margin almost straight, ocelli equidistant, viewed frontally, eyes as far apart measured medially as height of an eye. Pronotal plate projected forward, anterior and posterior parts fused laterally and medially very weakly, to enclose a fovea on either side of medial bridge (*cf.* Fig. 344); lateral margins of pronotum with tufts of pubescence on either side of lower margins of pronotal plate, surface polished. Mesoscutum smooth, polished, notaulices absent; lateral bars of scutellum smooth, polished; scutellar disc reticulate-rugose, apex conical, beak-shaped in lateral view; scutellar cup large, with apical fovea (*cf.* Fig. 356). Mesopleura smooth, polished, suture distinct, metapleura with long hairs on anterior margin, anteroventral cavity open basally, a few hairs present. Propodeal carinae parallel, converging at juncture with nucha, densely pubescent on lateral margins, with sparse hairs medially. Segment 1 of gaster ridged, obscured by a ring of dense pubescence at base of tergite 2, tergites 3 and 4 partially visible in lateral view, gaster impunctate, hypopygium weakly protruding. Legs long, slender, pubescent. Wings narrow, surface pubescent, apical margins with a hair fringe, radial cell of forewing closed on wing margin, venation pale yellow, vein *M* (cubitus) not indicated. Colour: head and thorax brownish black, gaster brownish yellow, legs orange-yellow, antenna yellow basally, apical segments darkish.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Mt Cameroon, Mann's Quelle, 7400 ft (2250 m), 30.i.1932 (*M. Steele*) (BMNH).

Paratypes. **Cameroun:** 3 ♀ (BMNH), same data as holotype (one damaged).

REMARKS. Distinguished from the closely related species *gracilicornis* by the antennal segment ratios.

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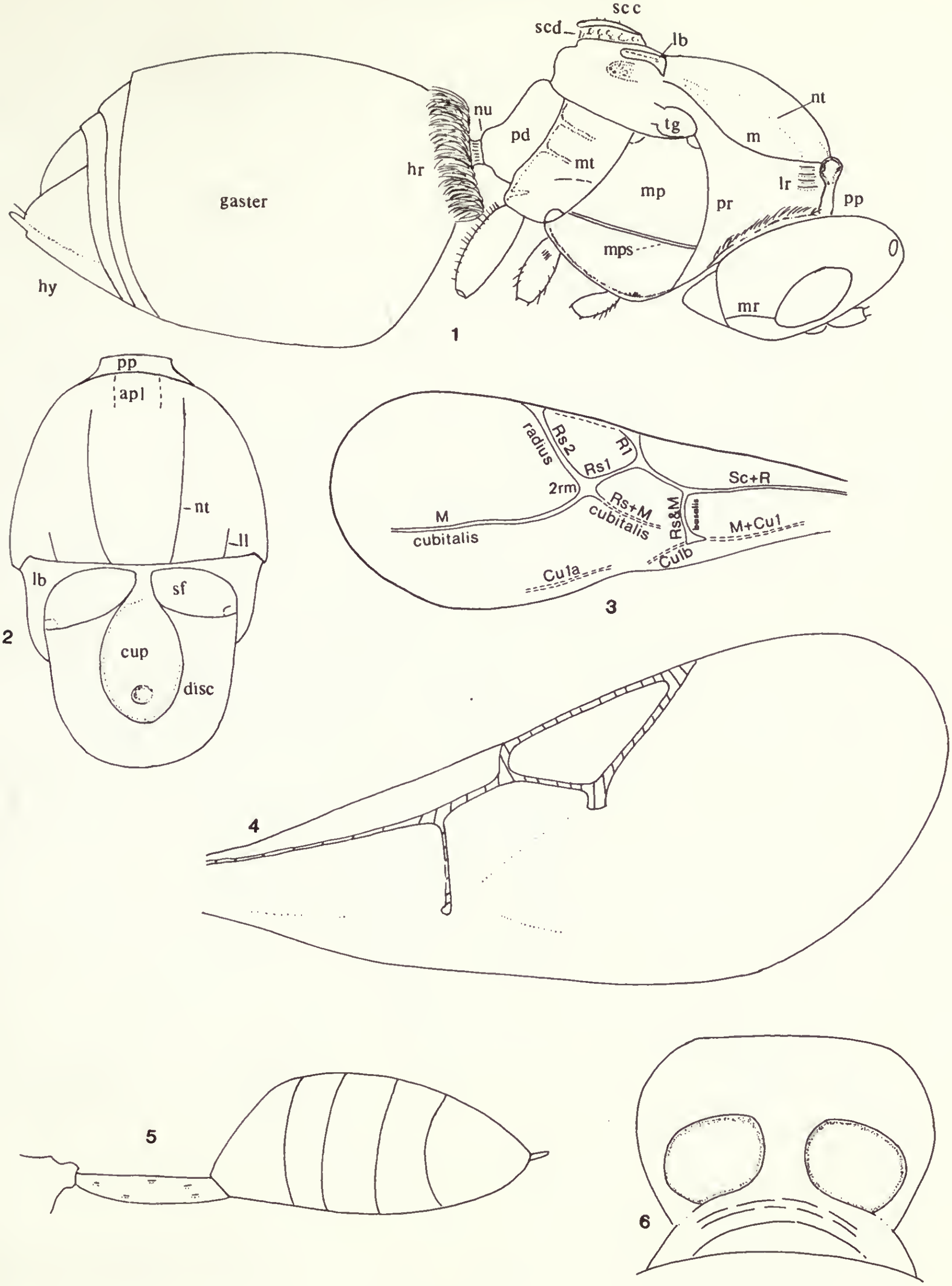

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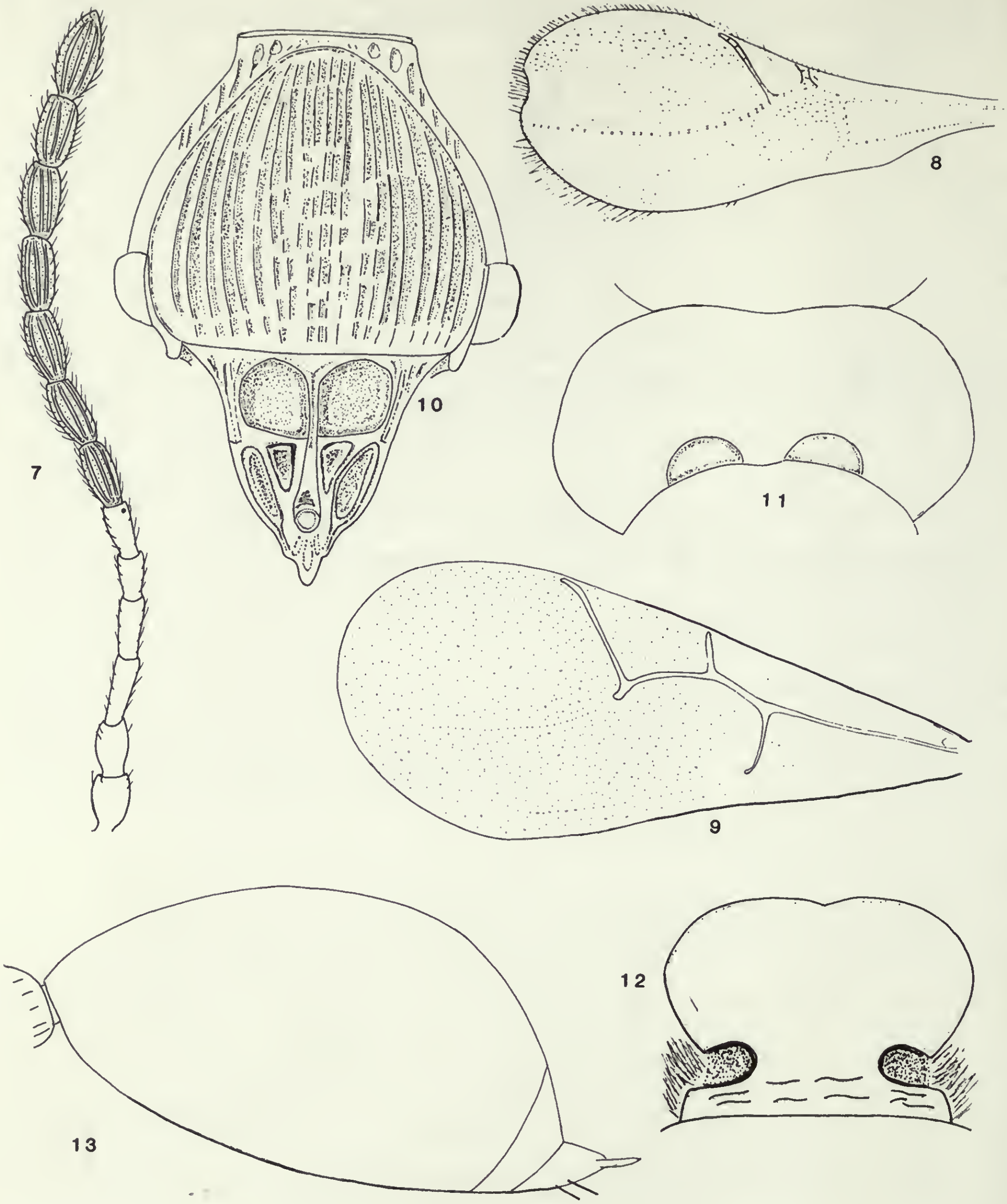

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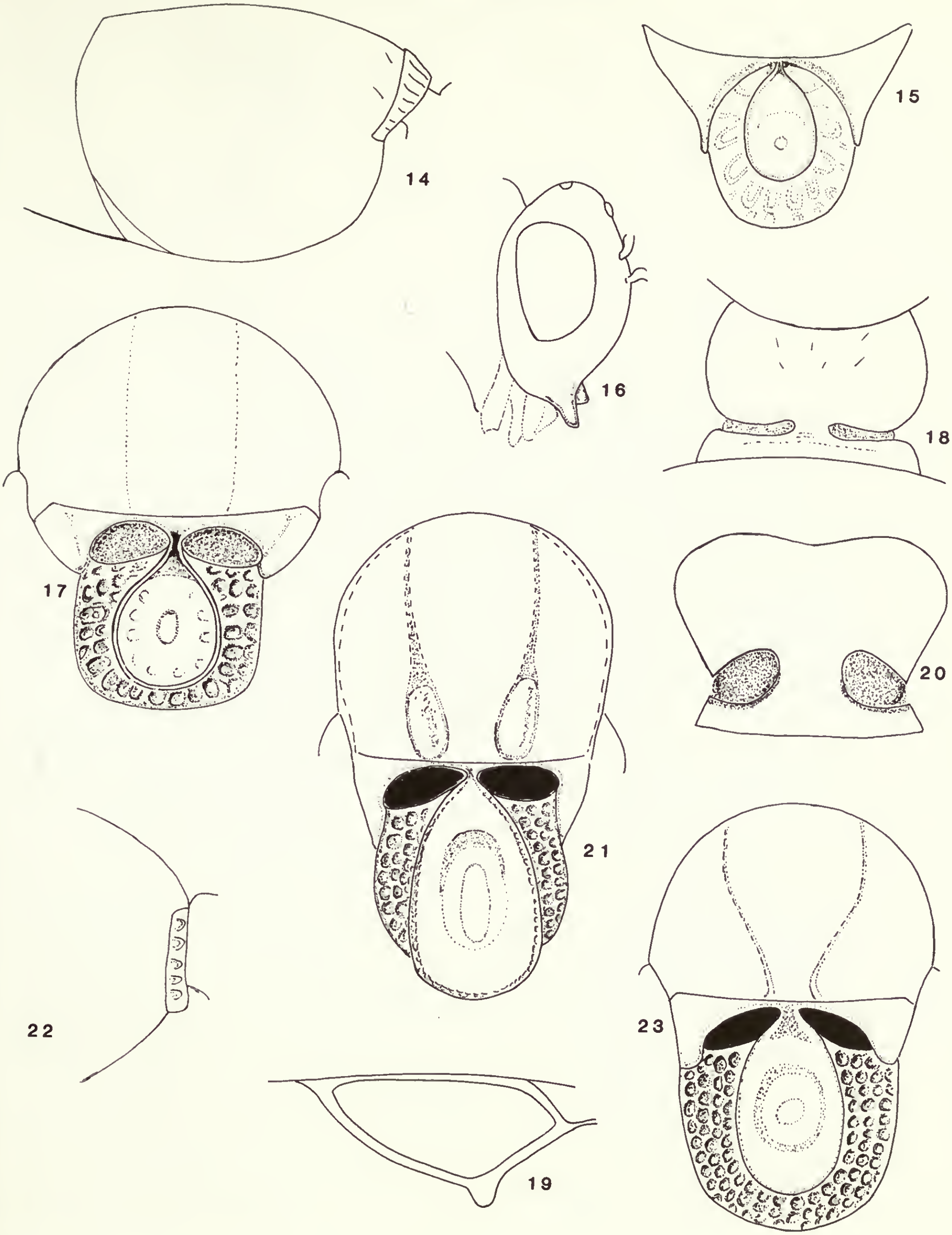

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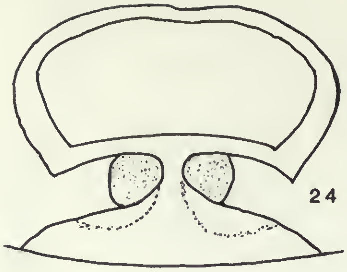
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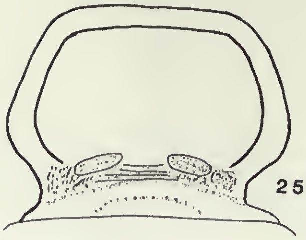
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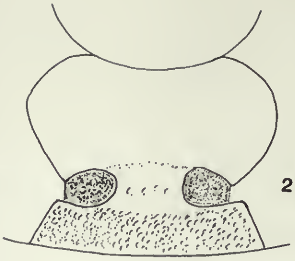
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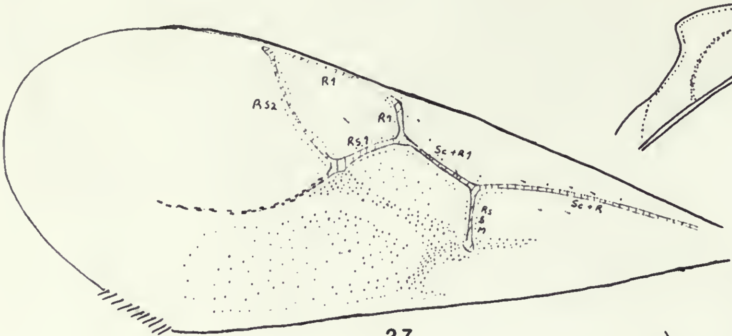

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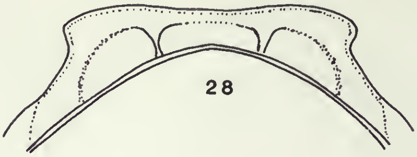
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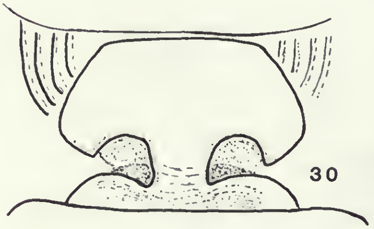
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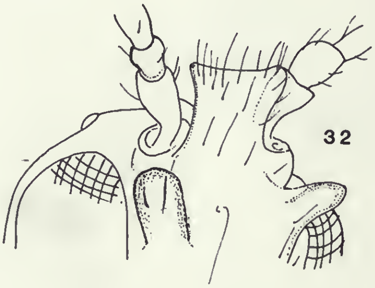
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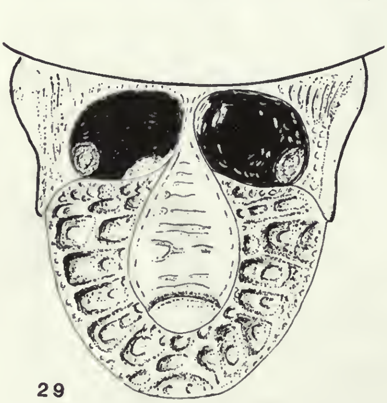
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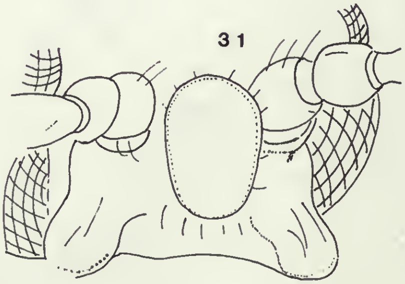
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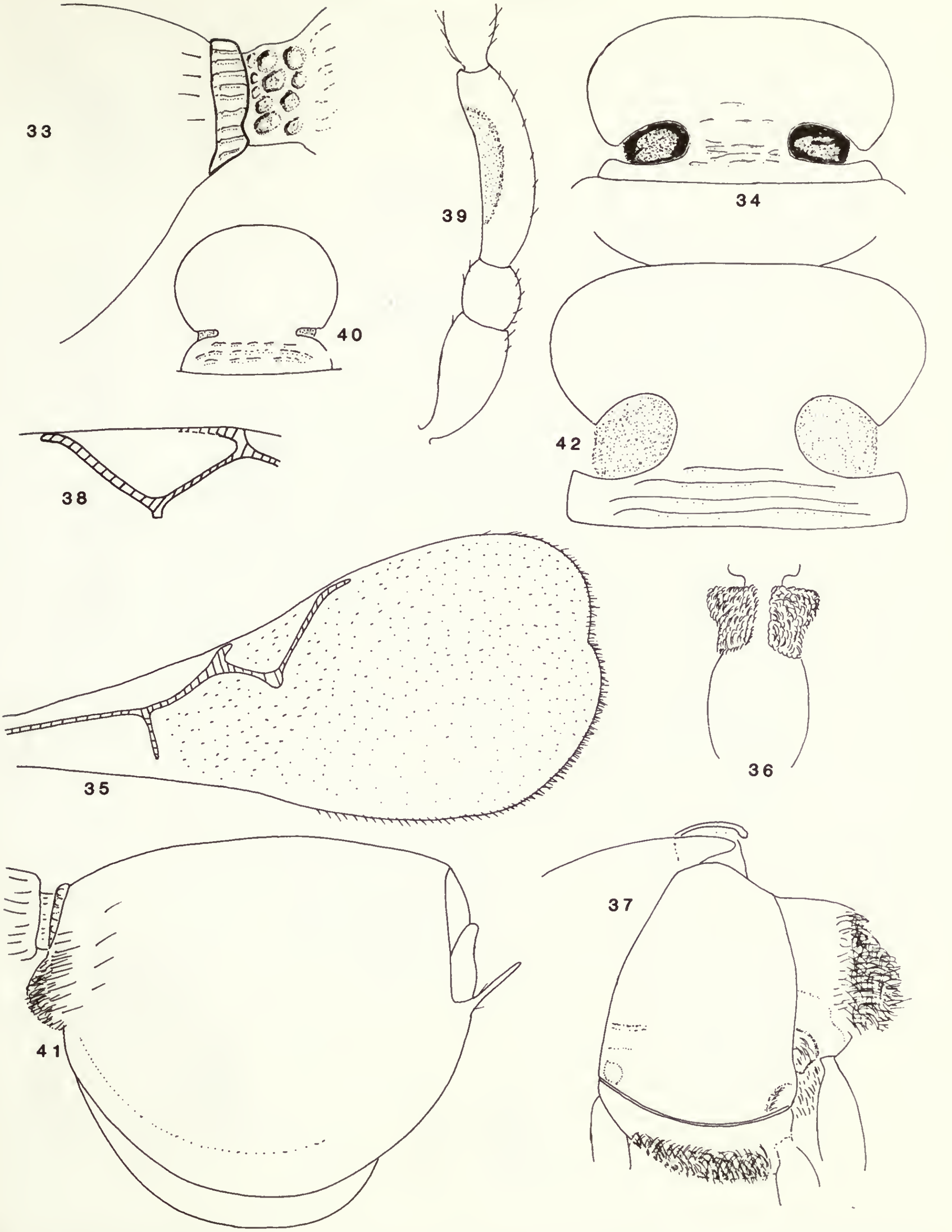

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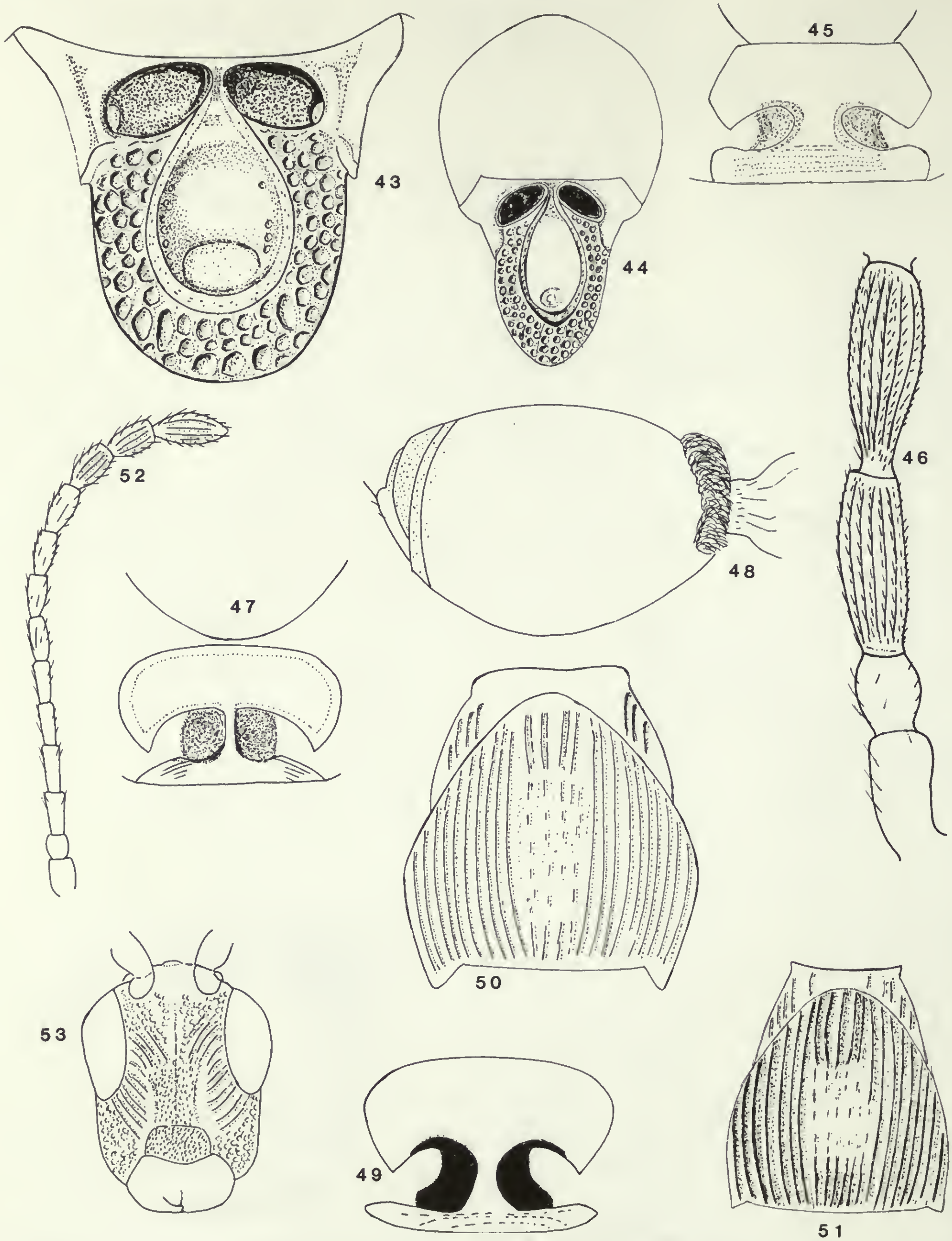

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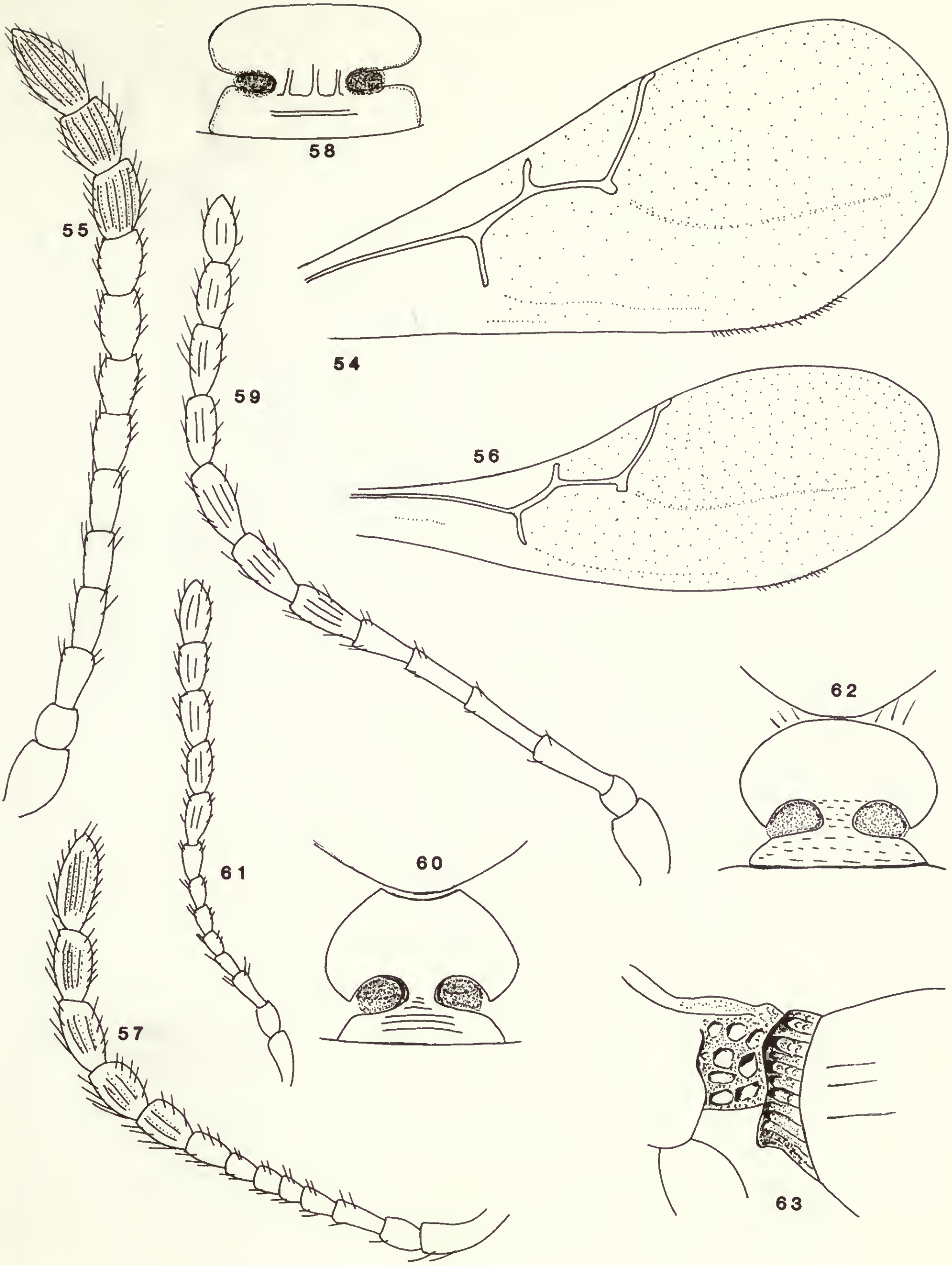

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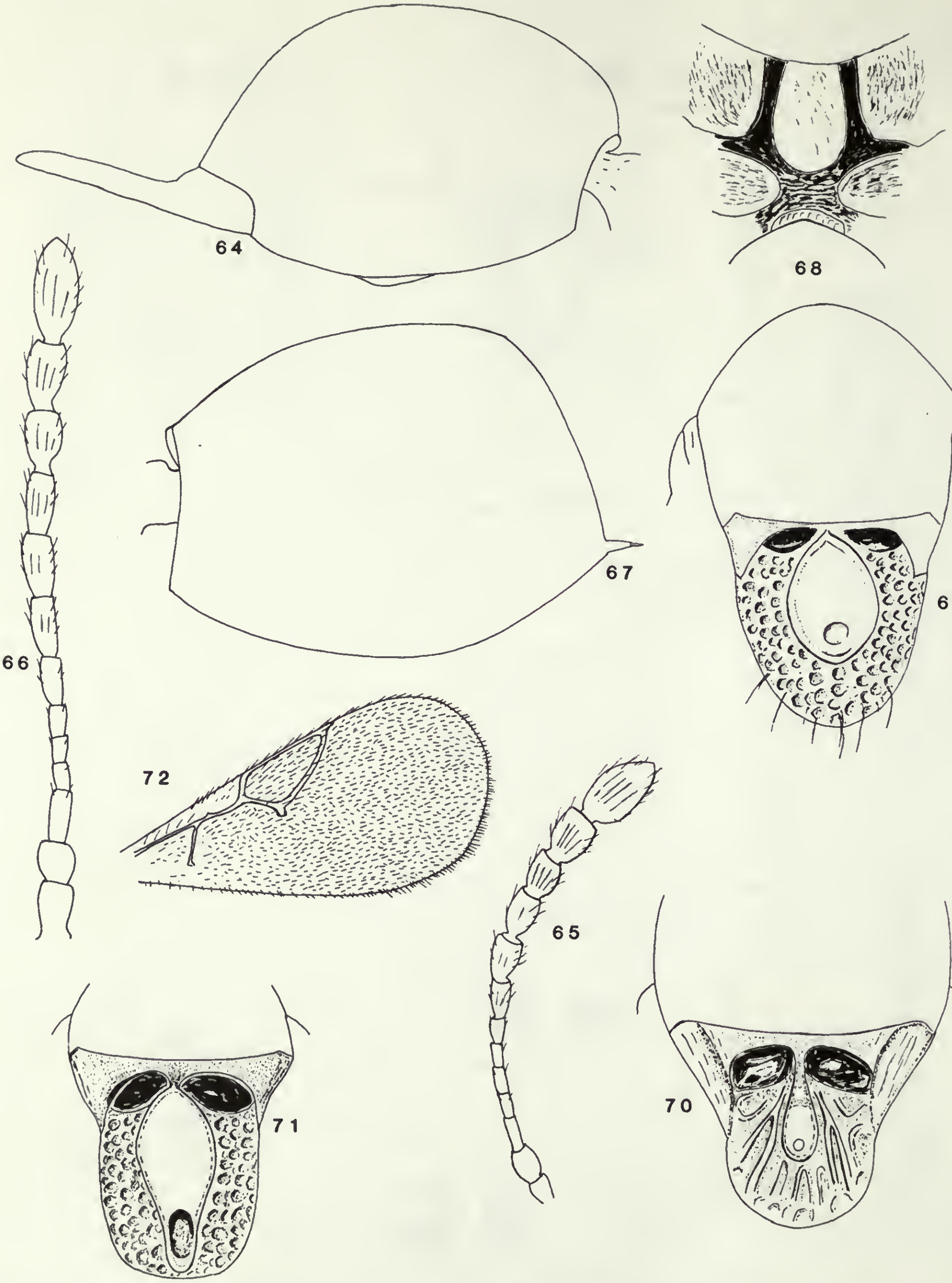

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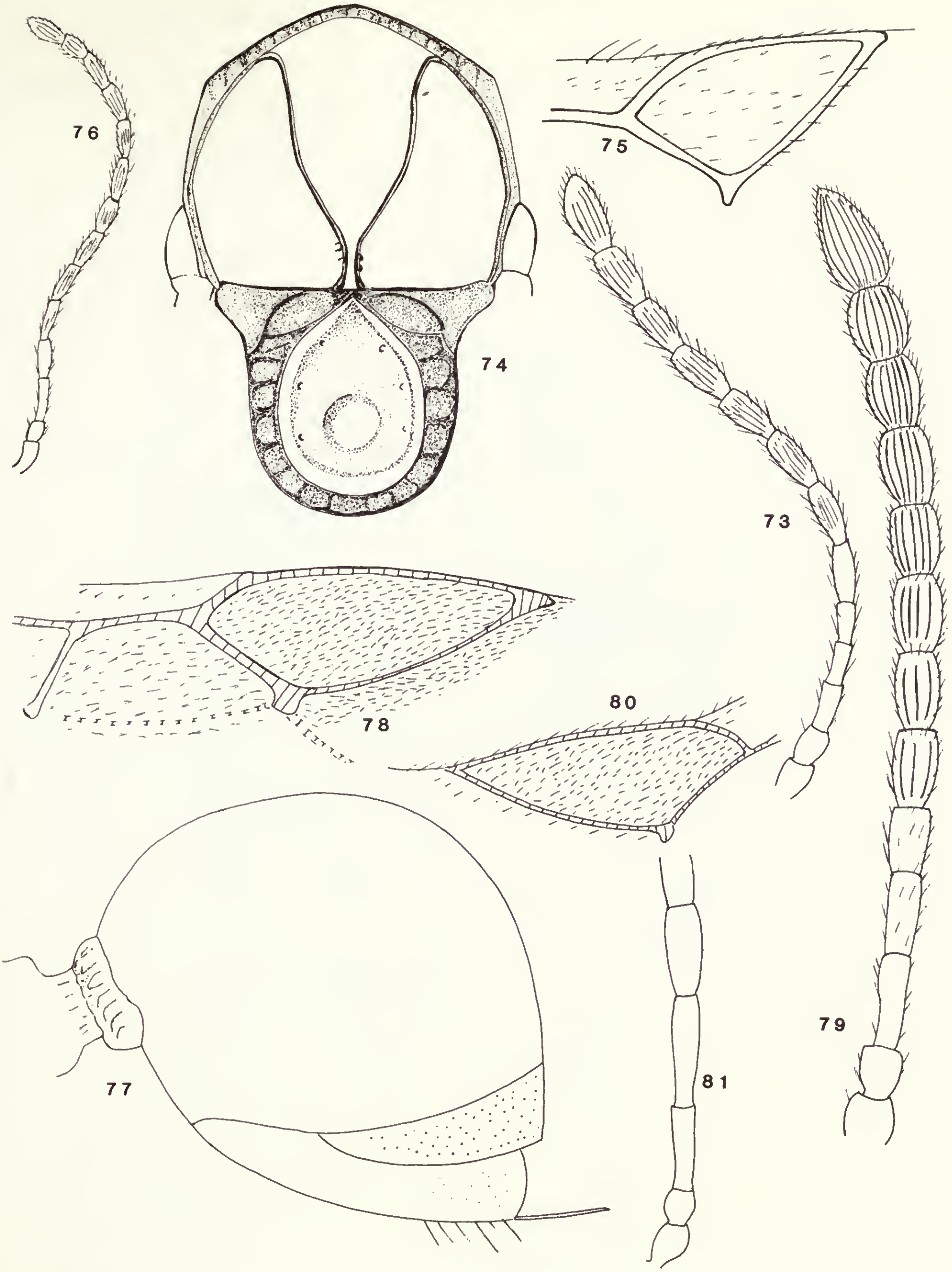

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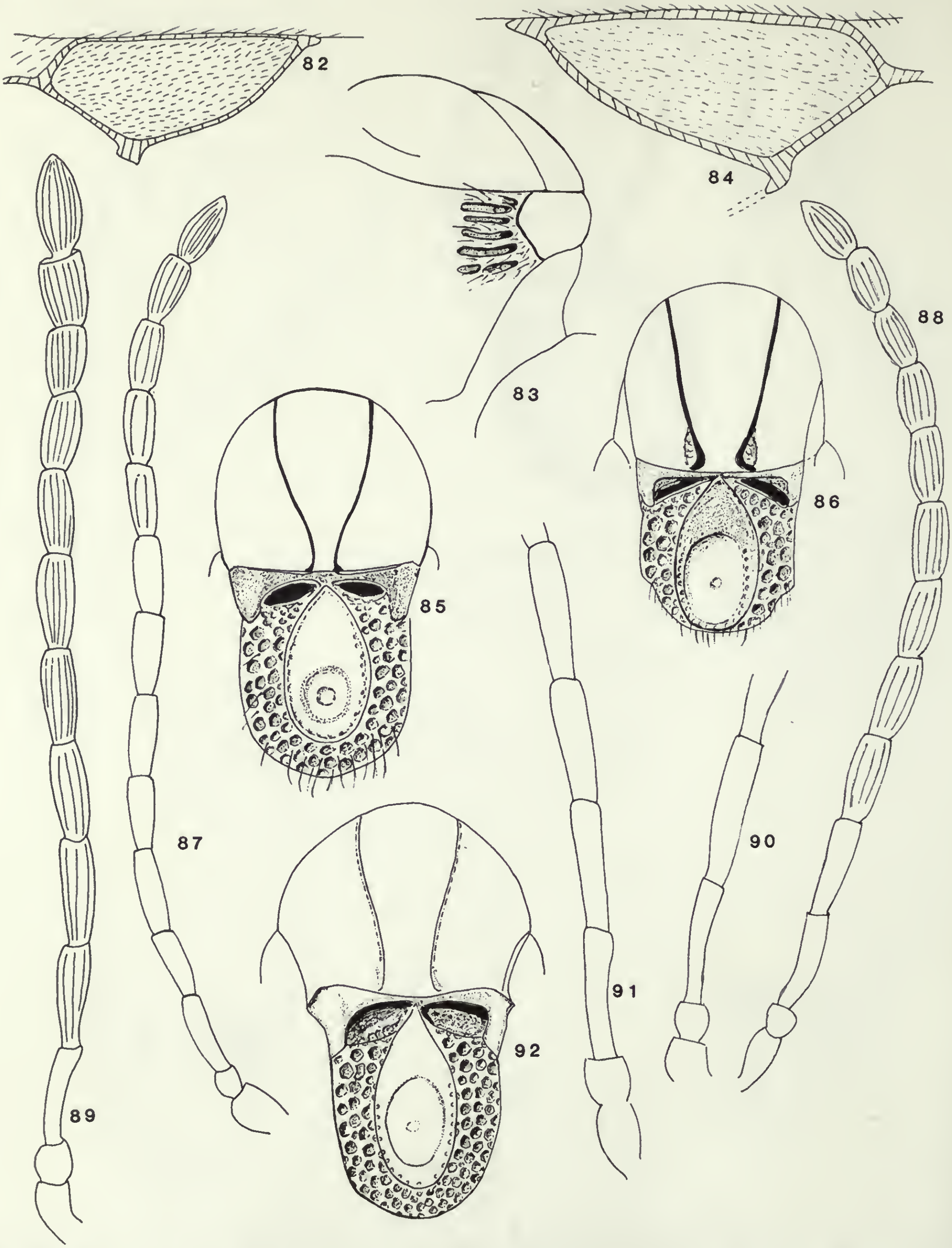

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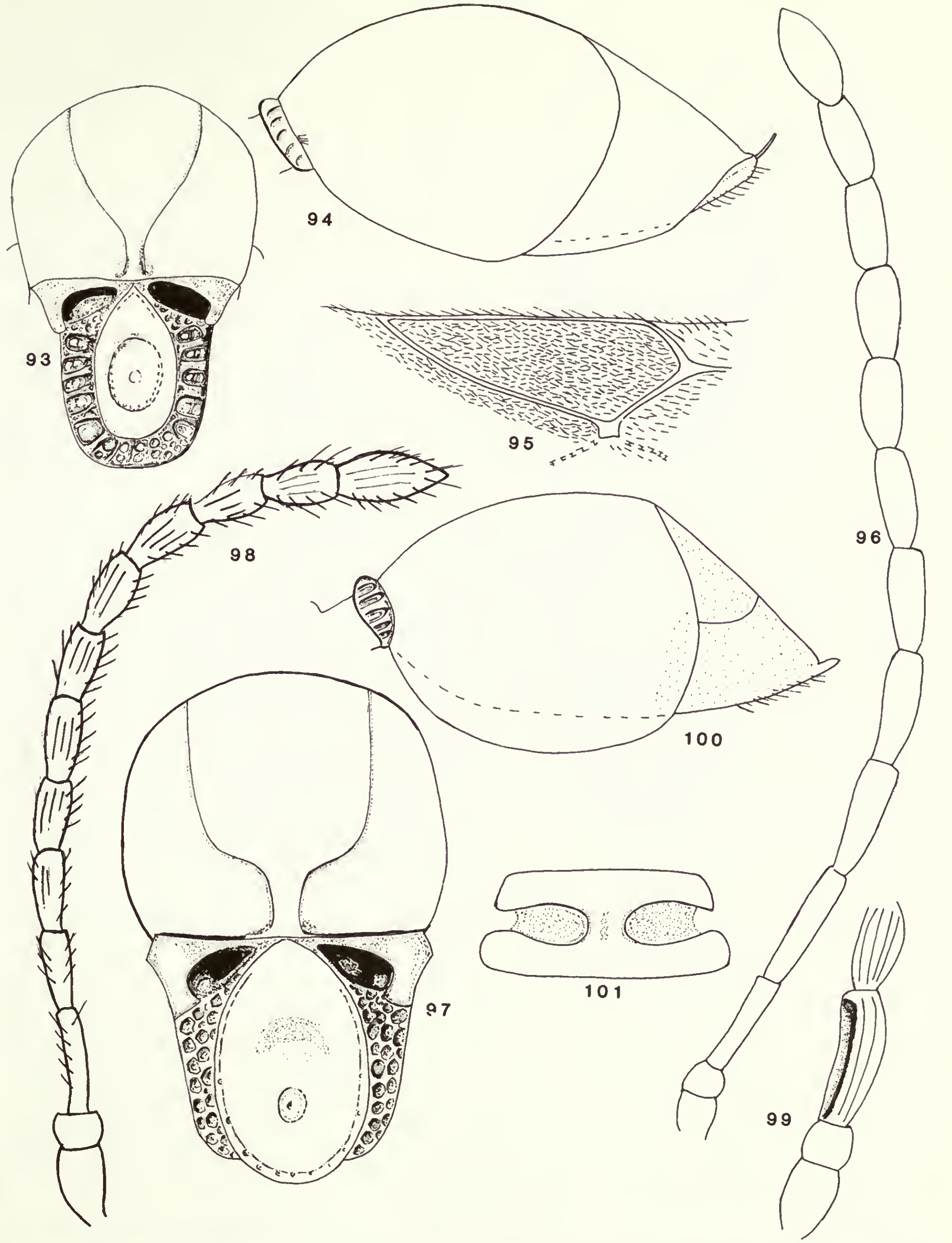

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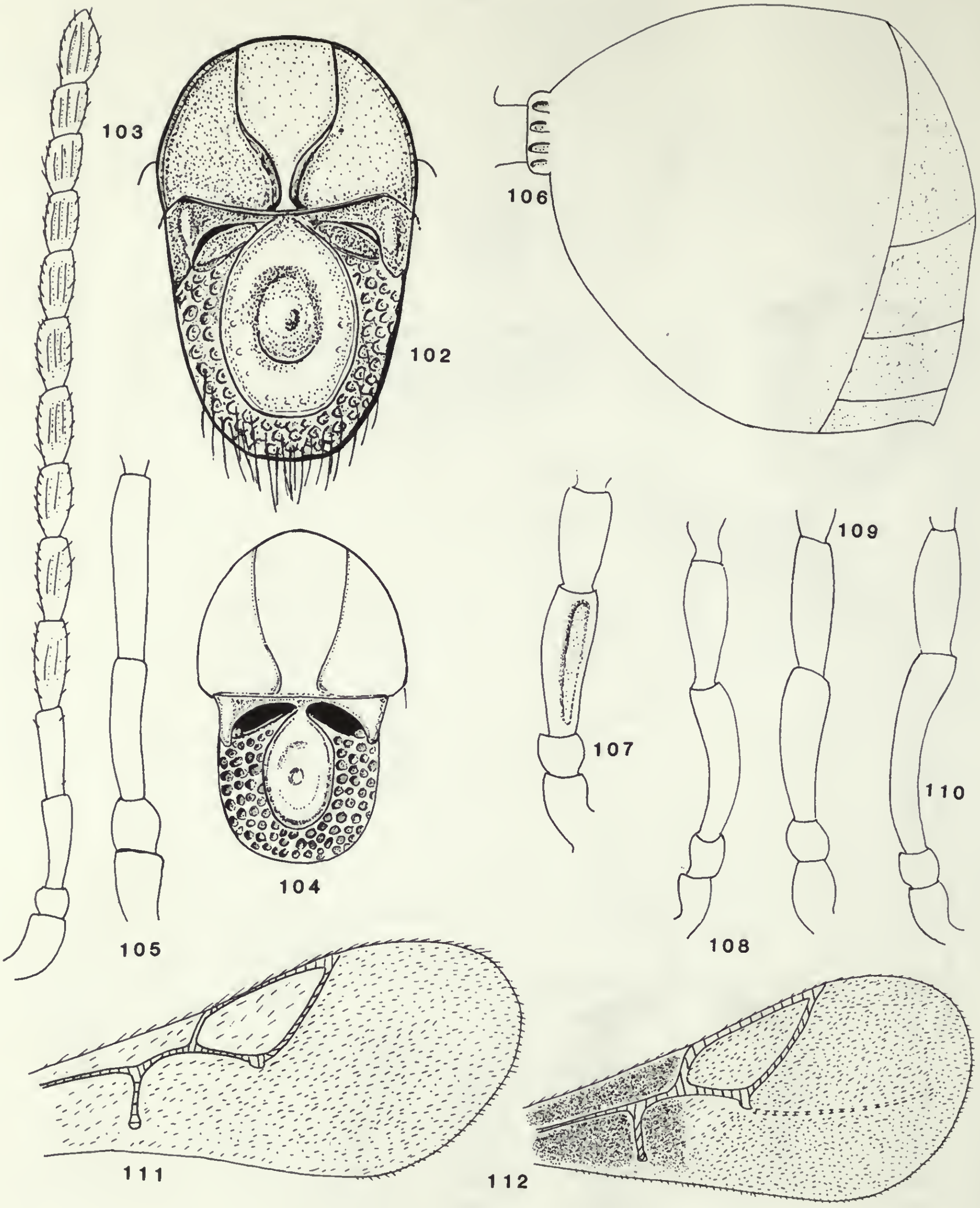

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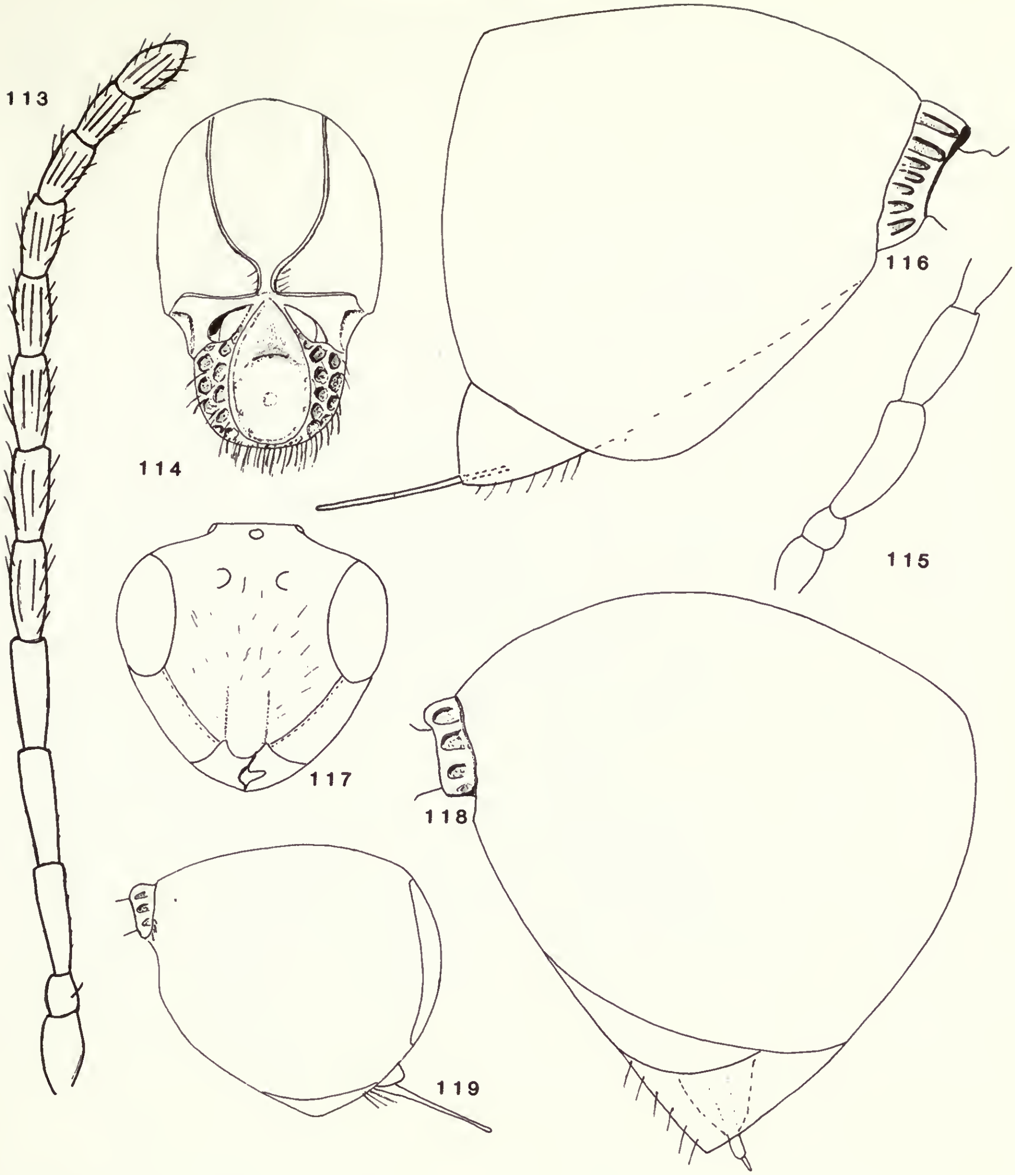

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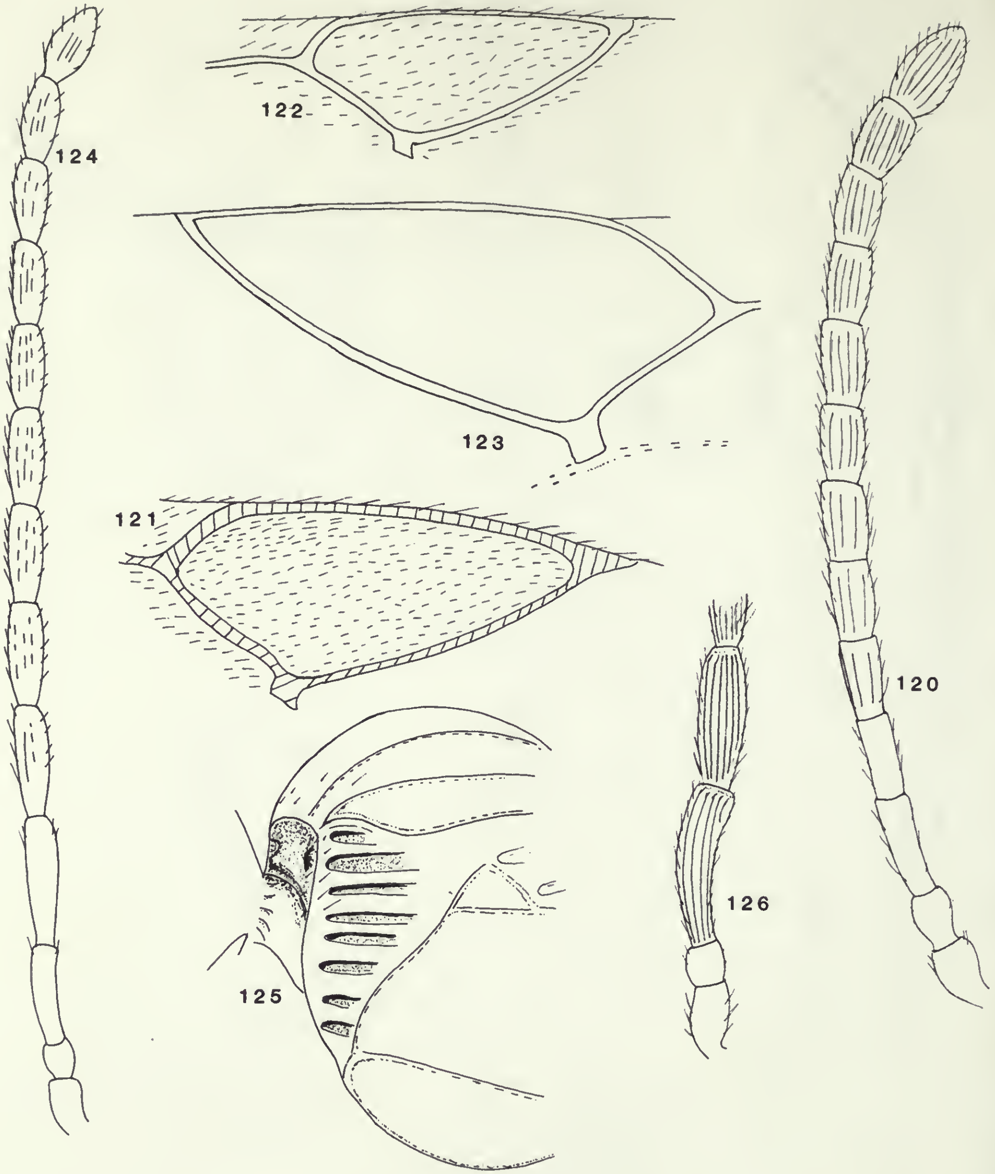

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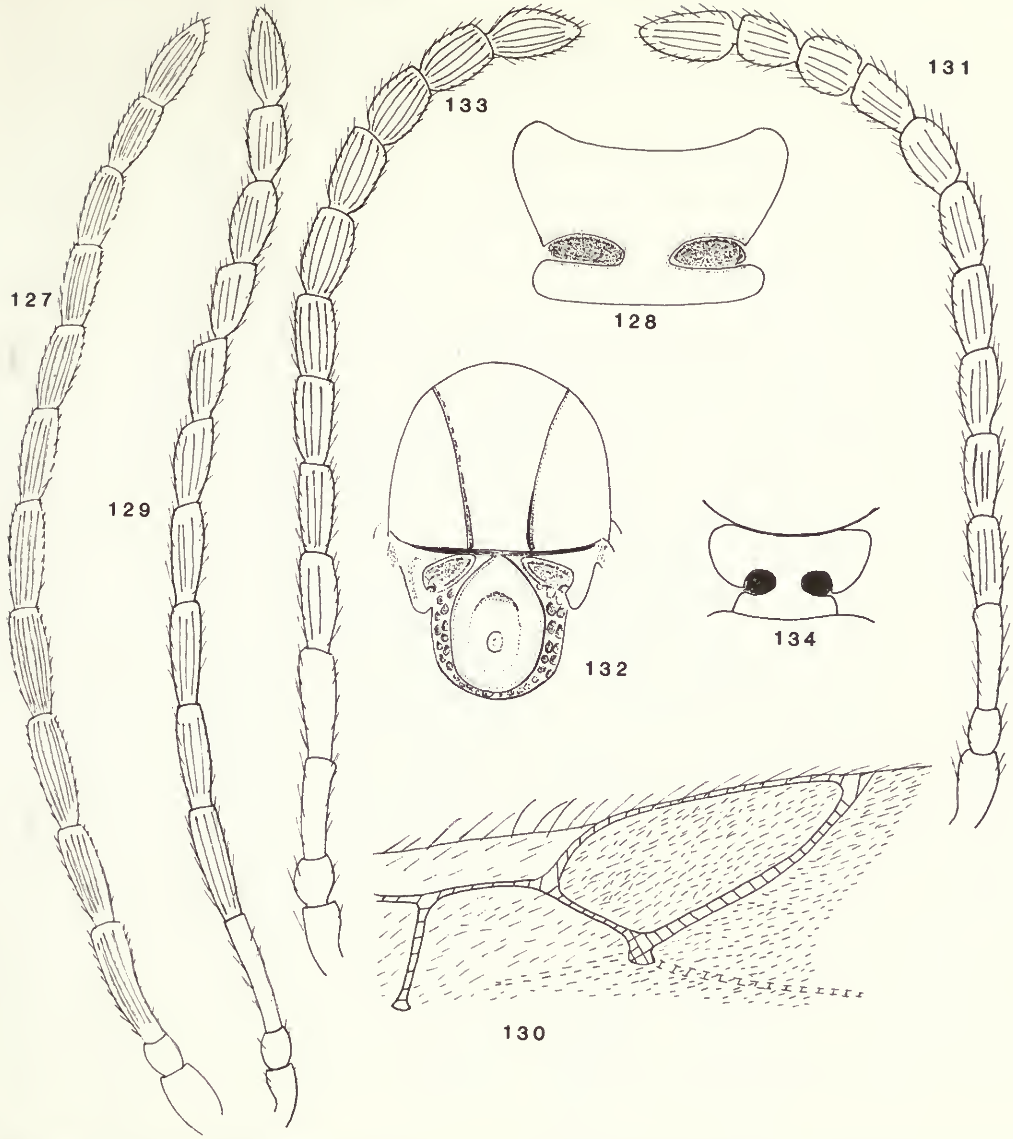

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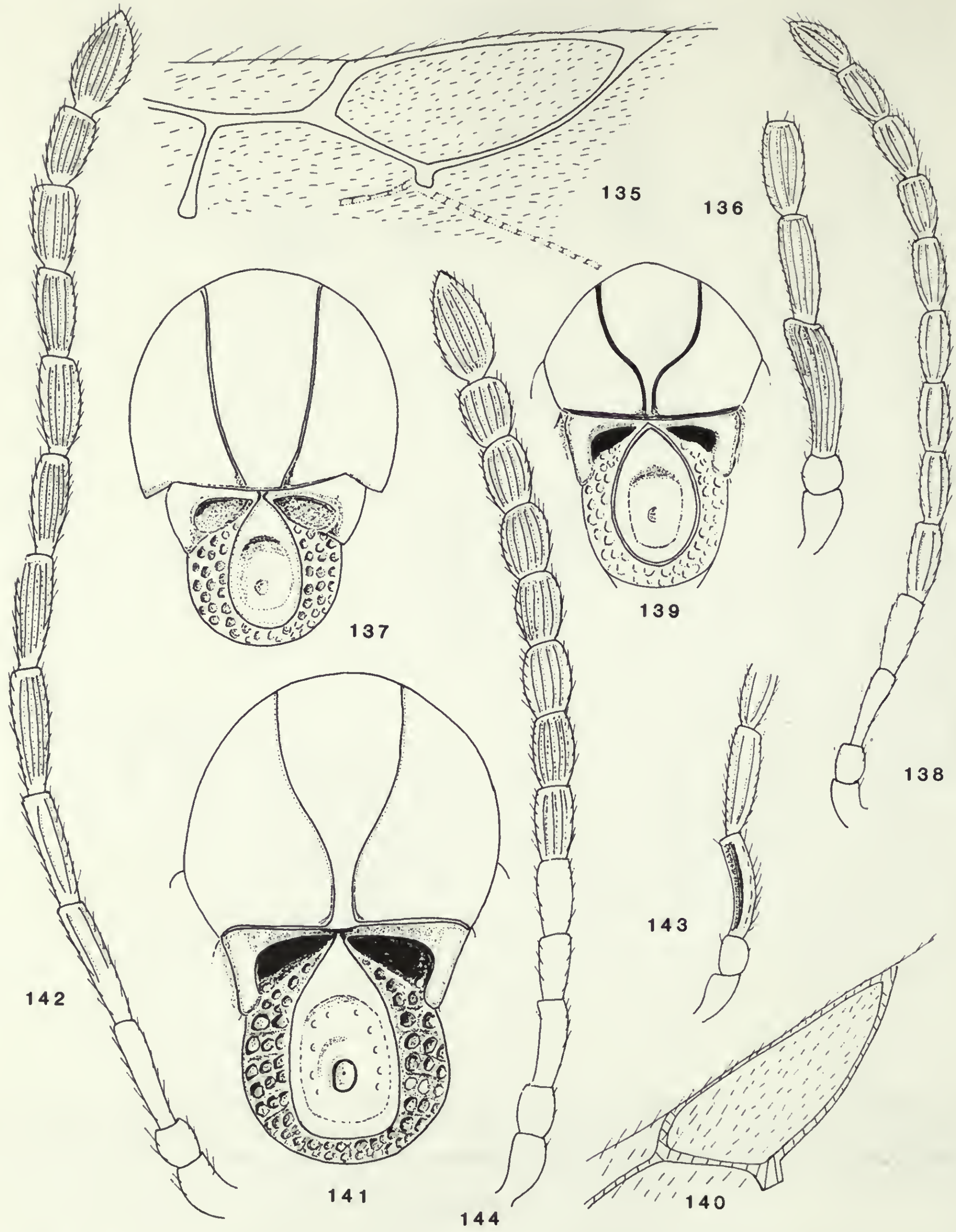

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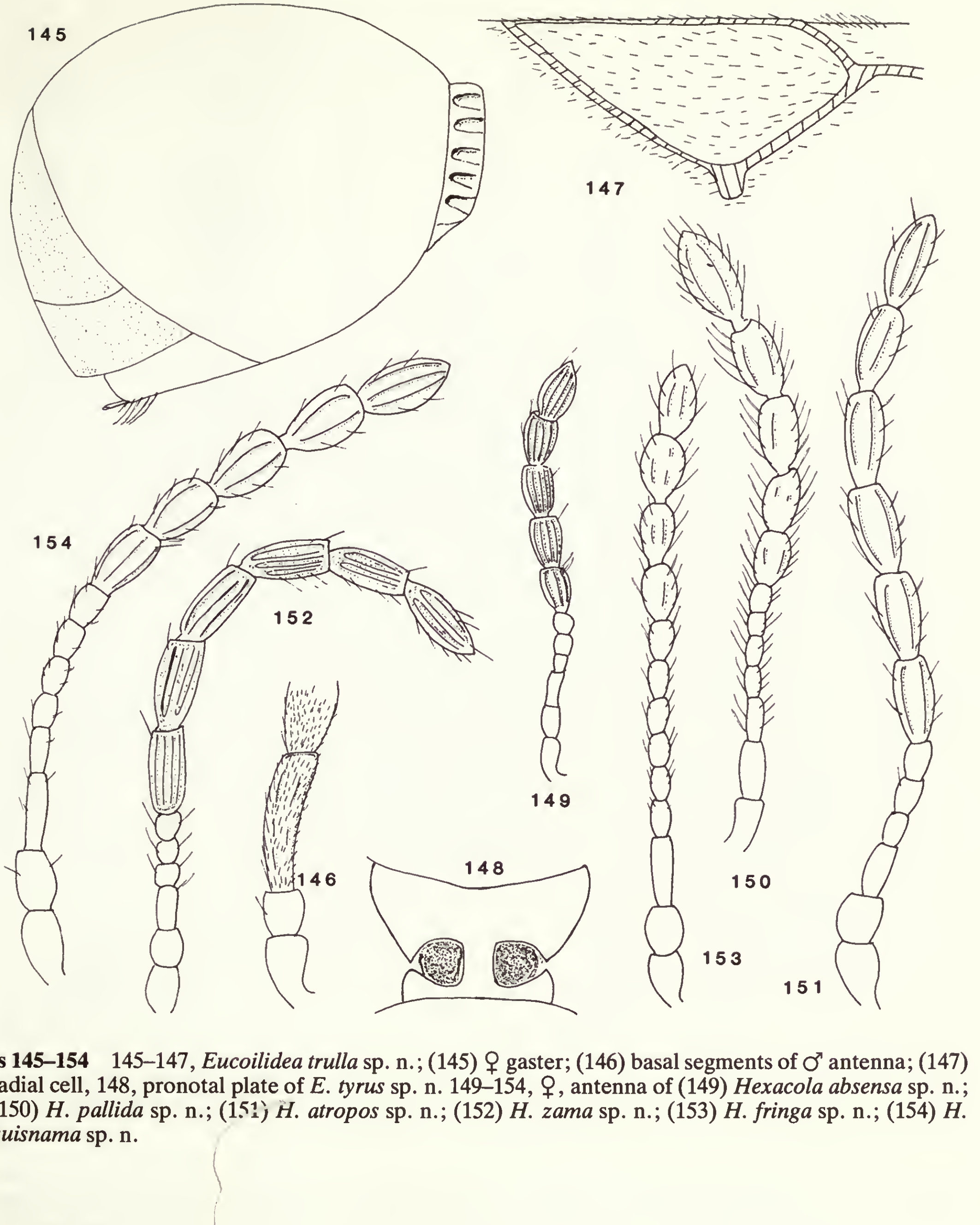

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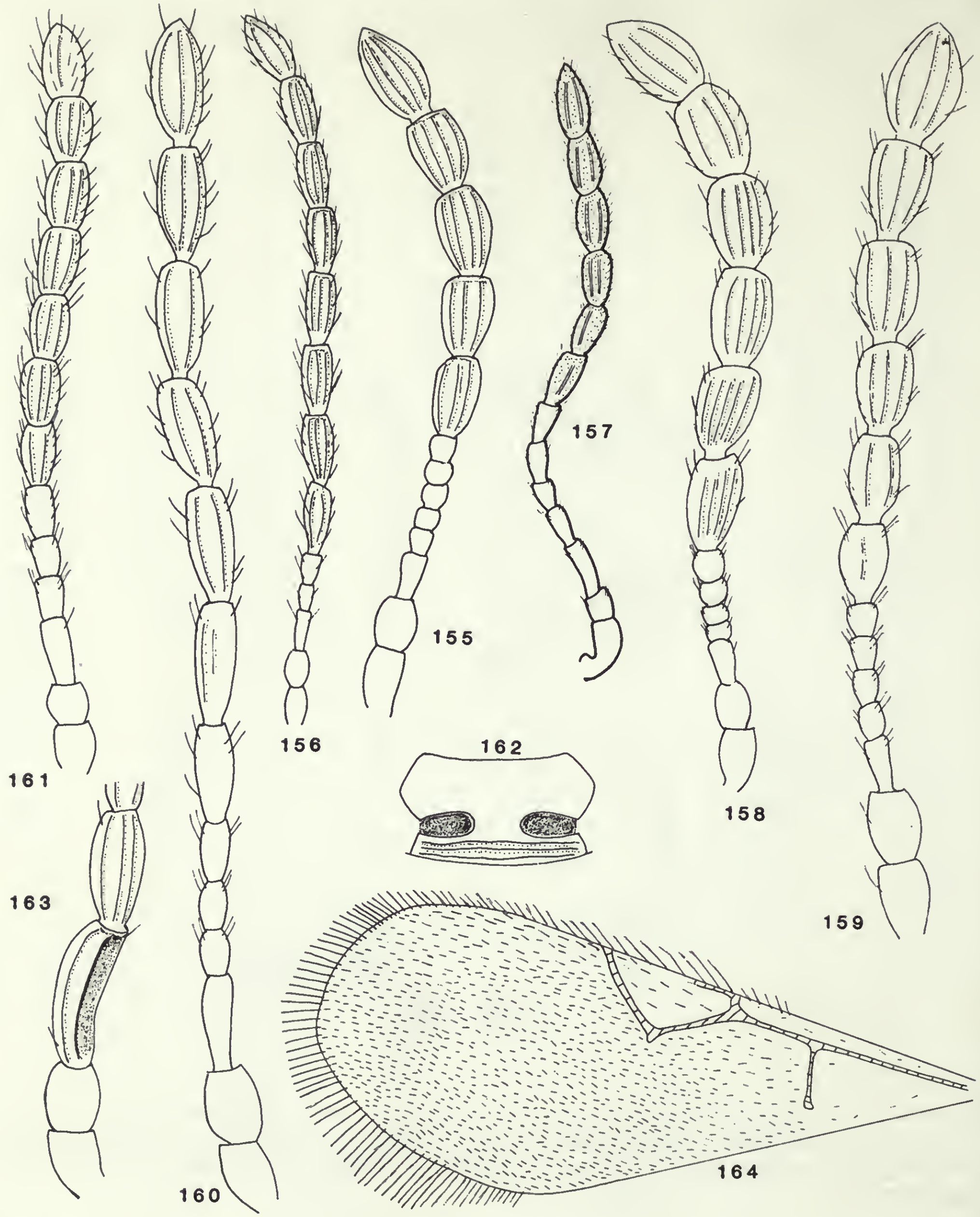

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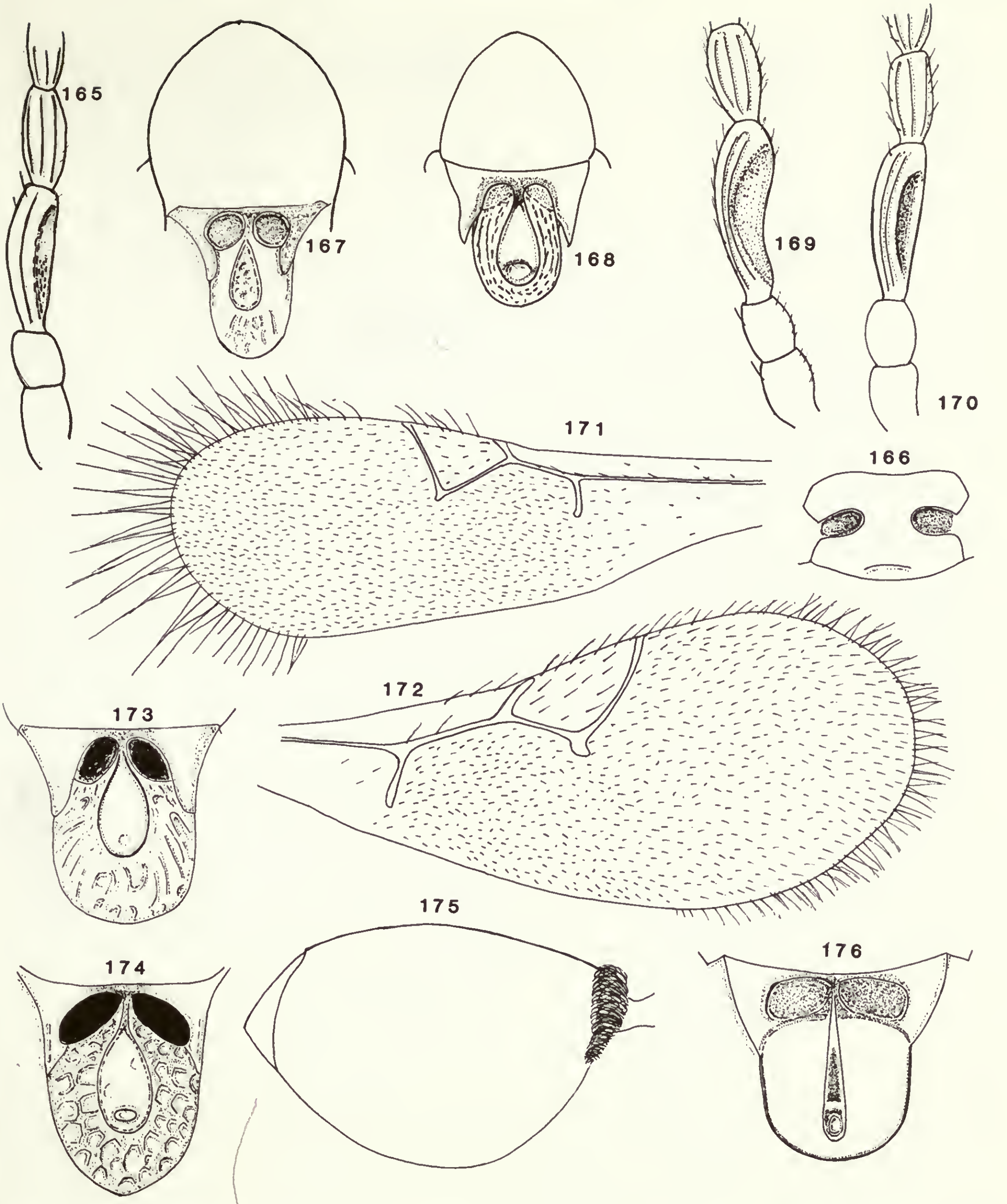

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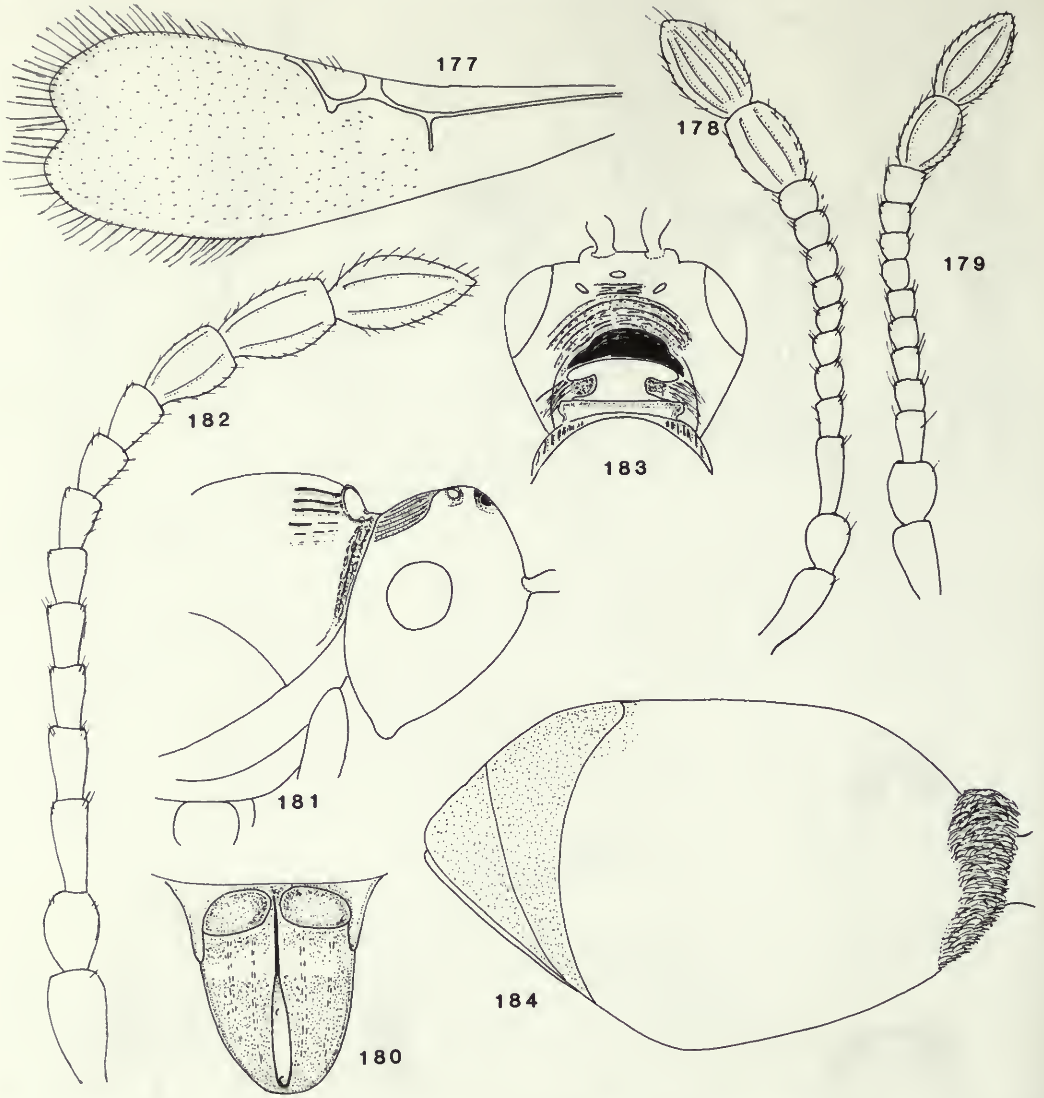

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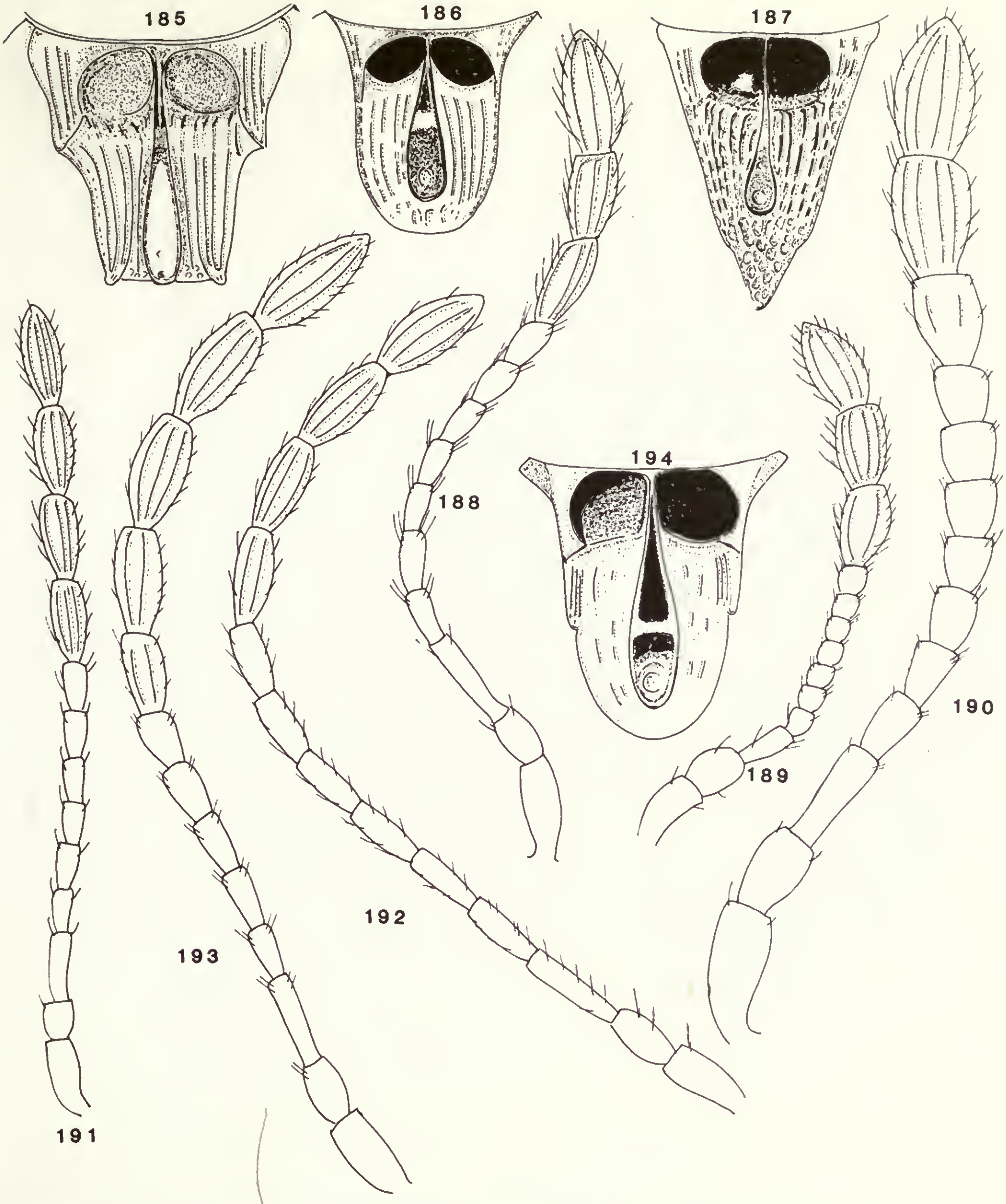

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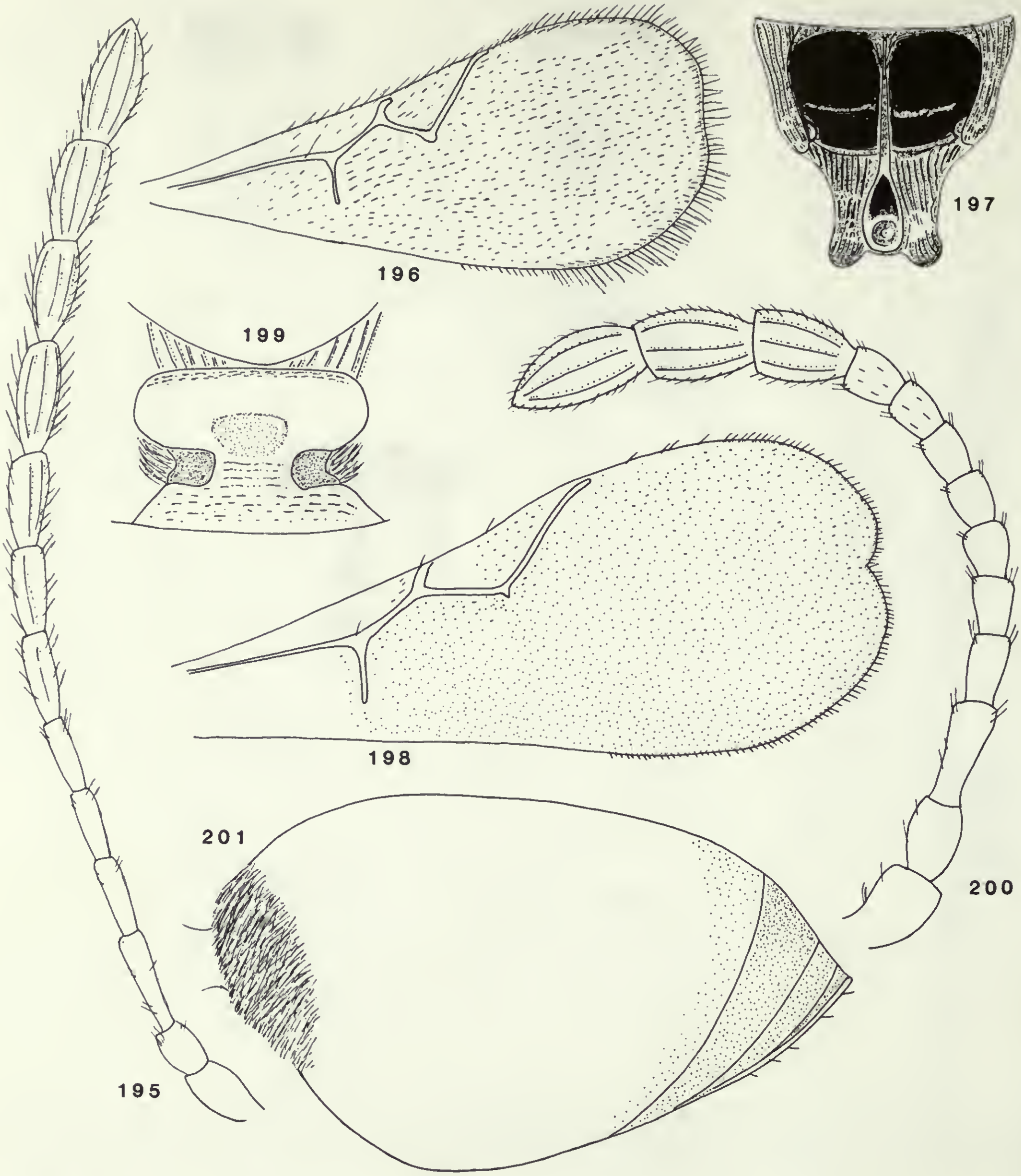

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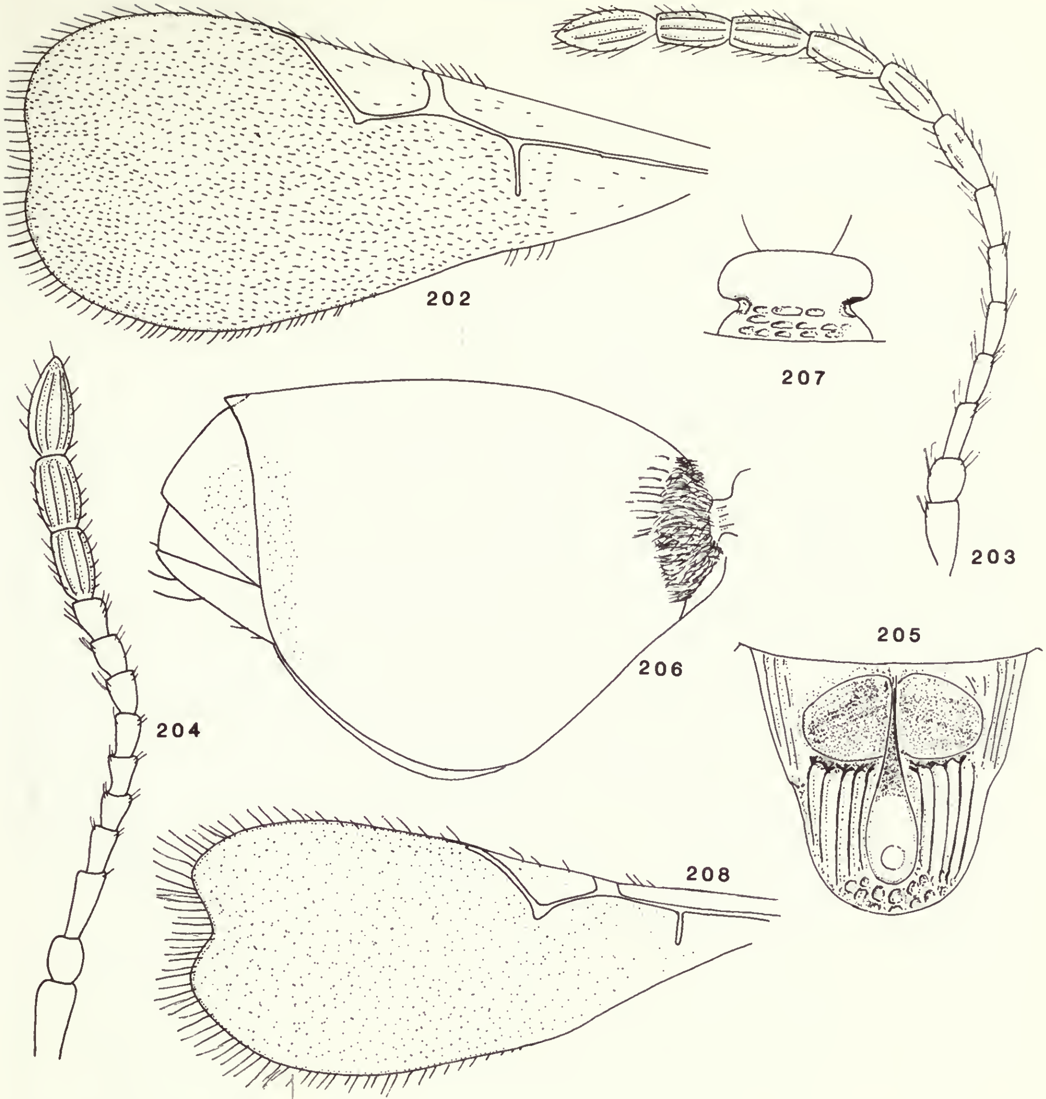

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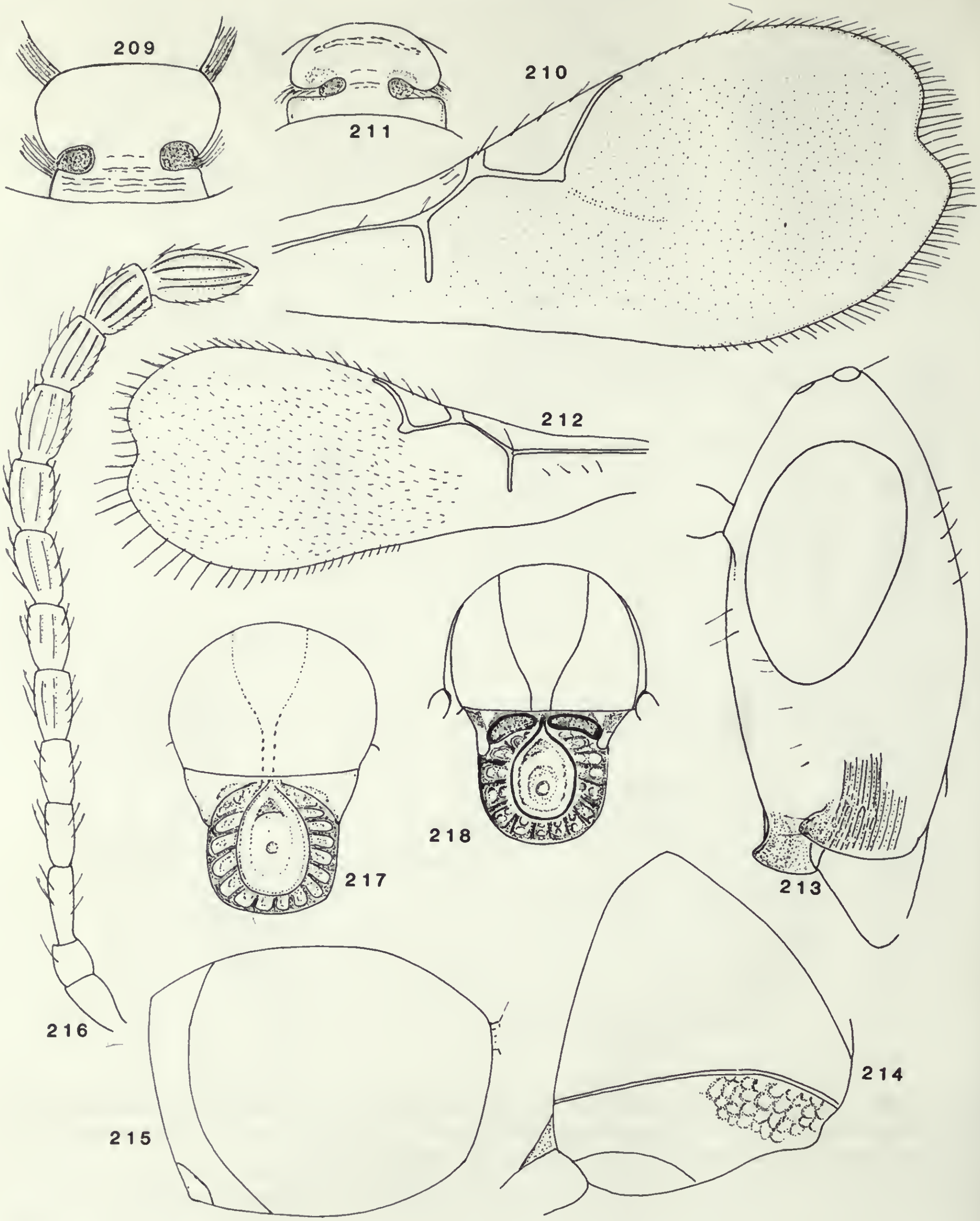

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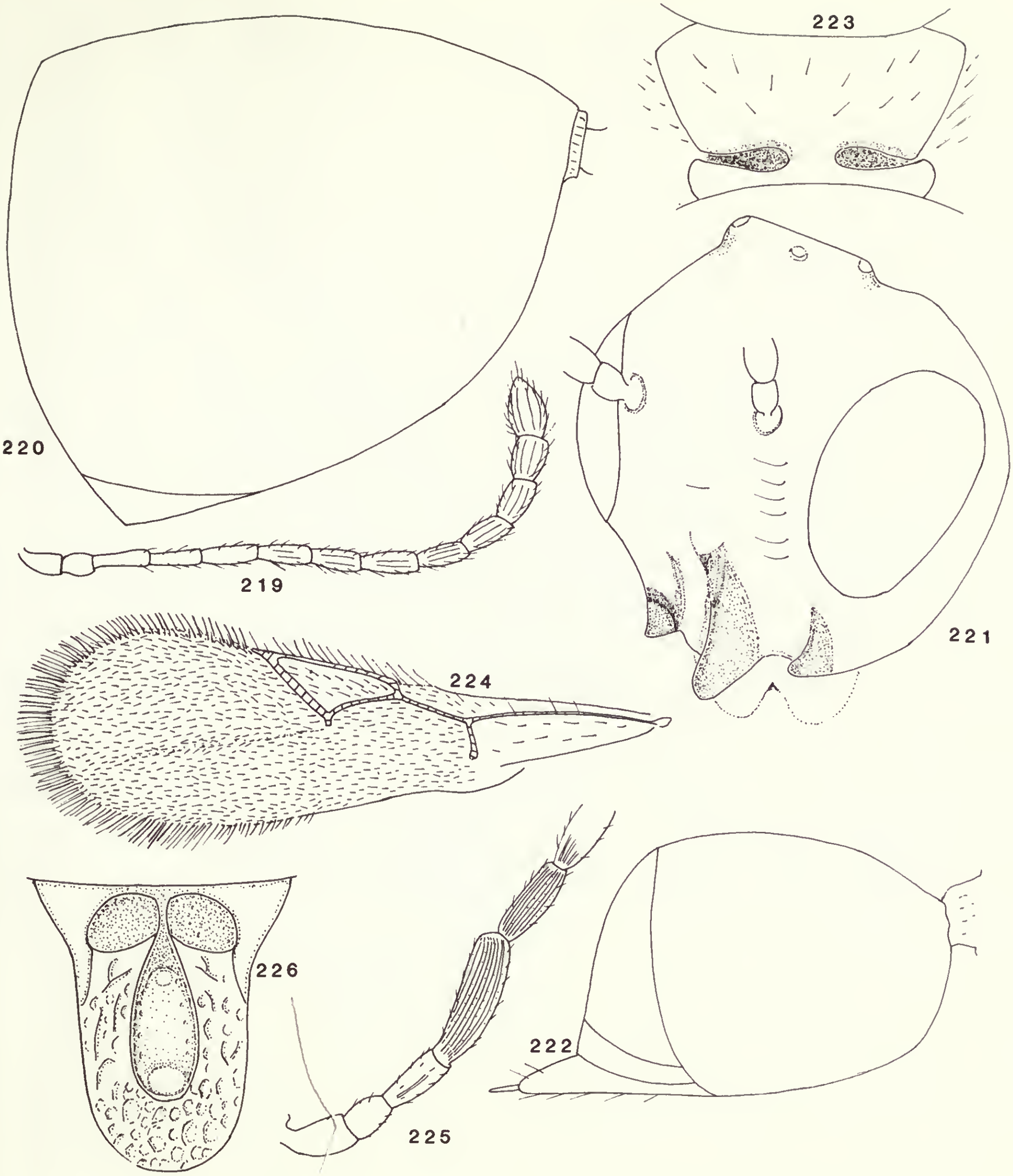

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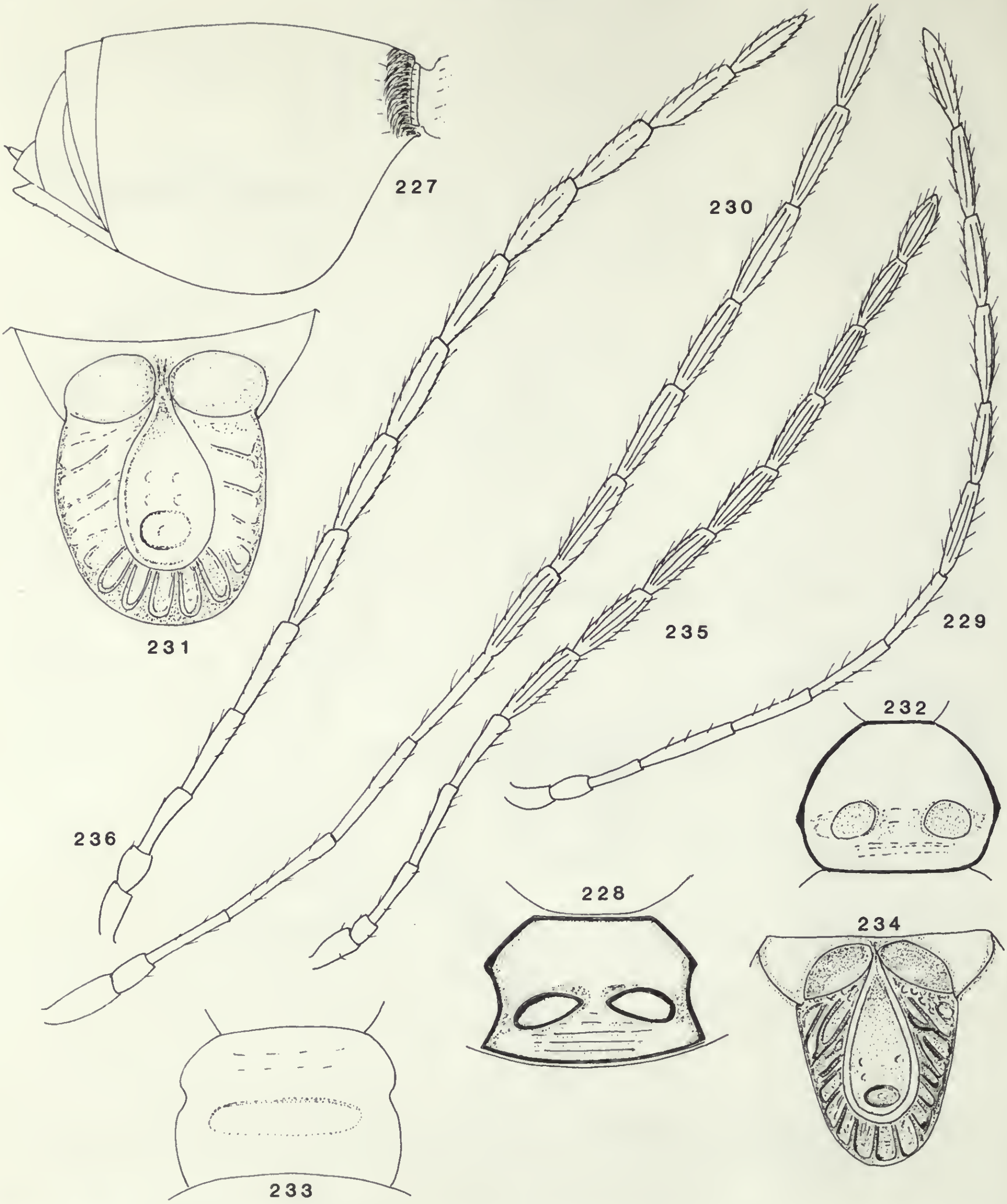

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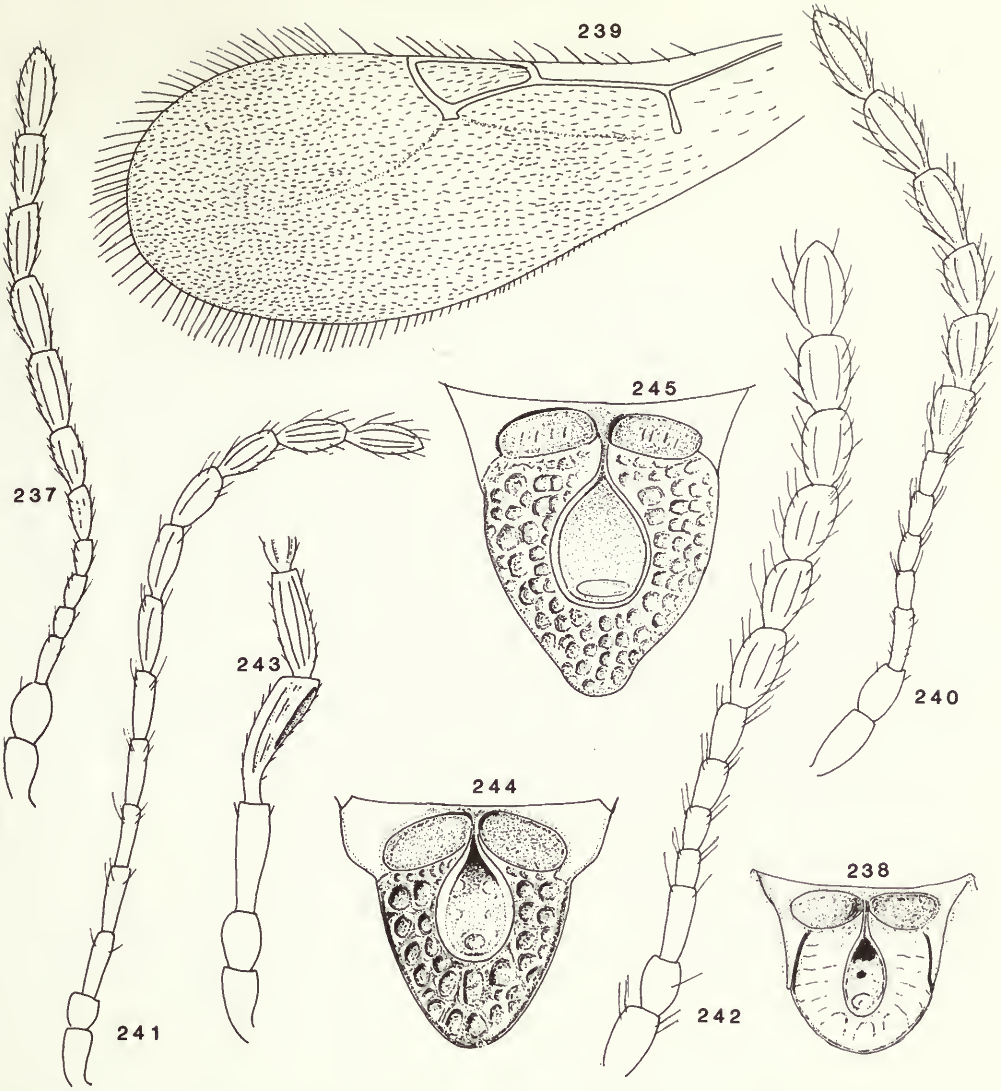

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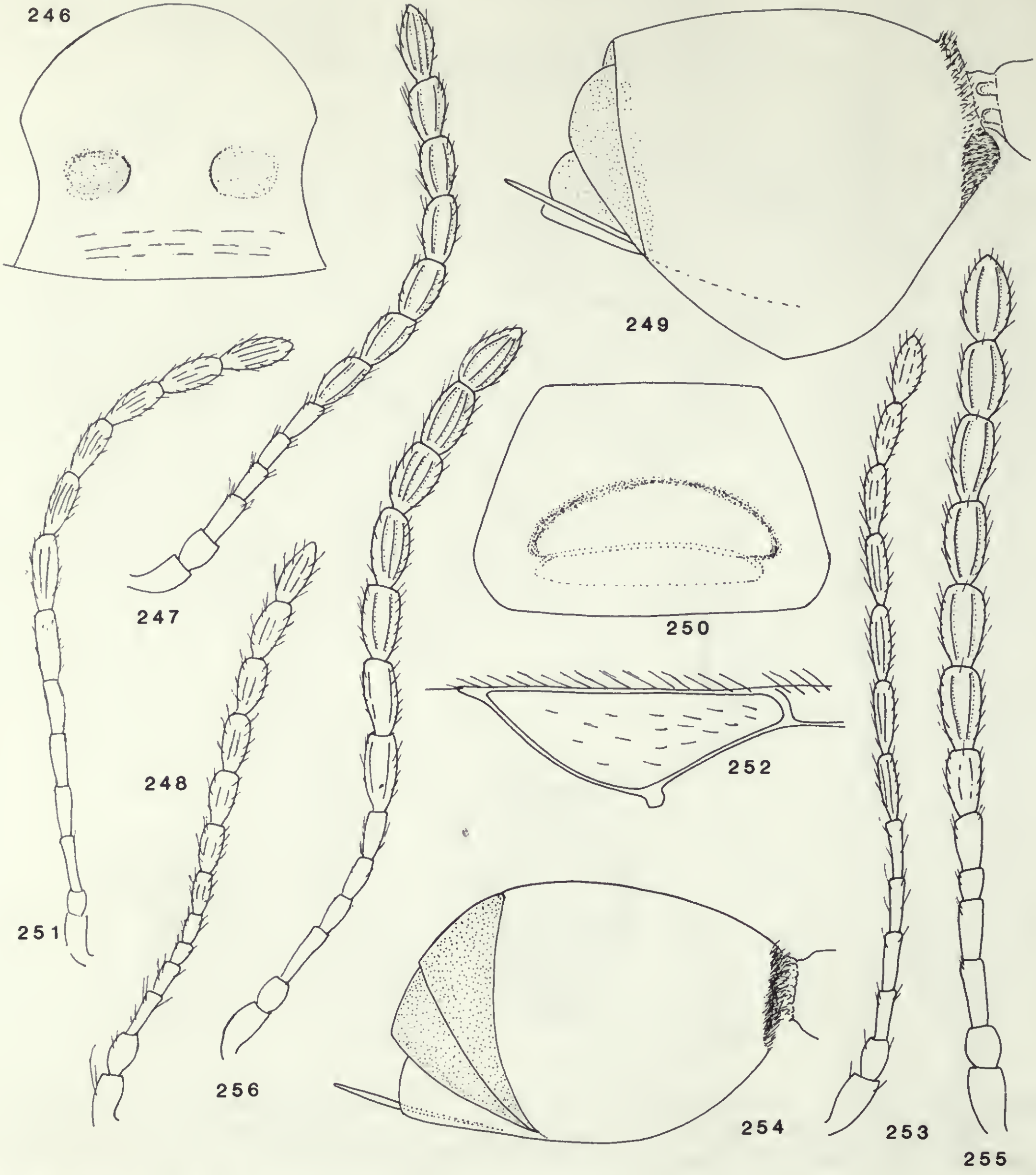

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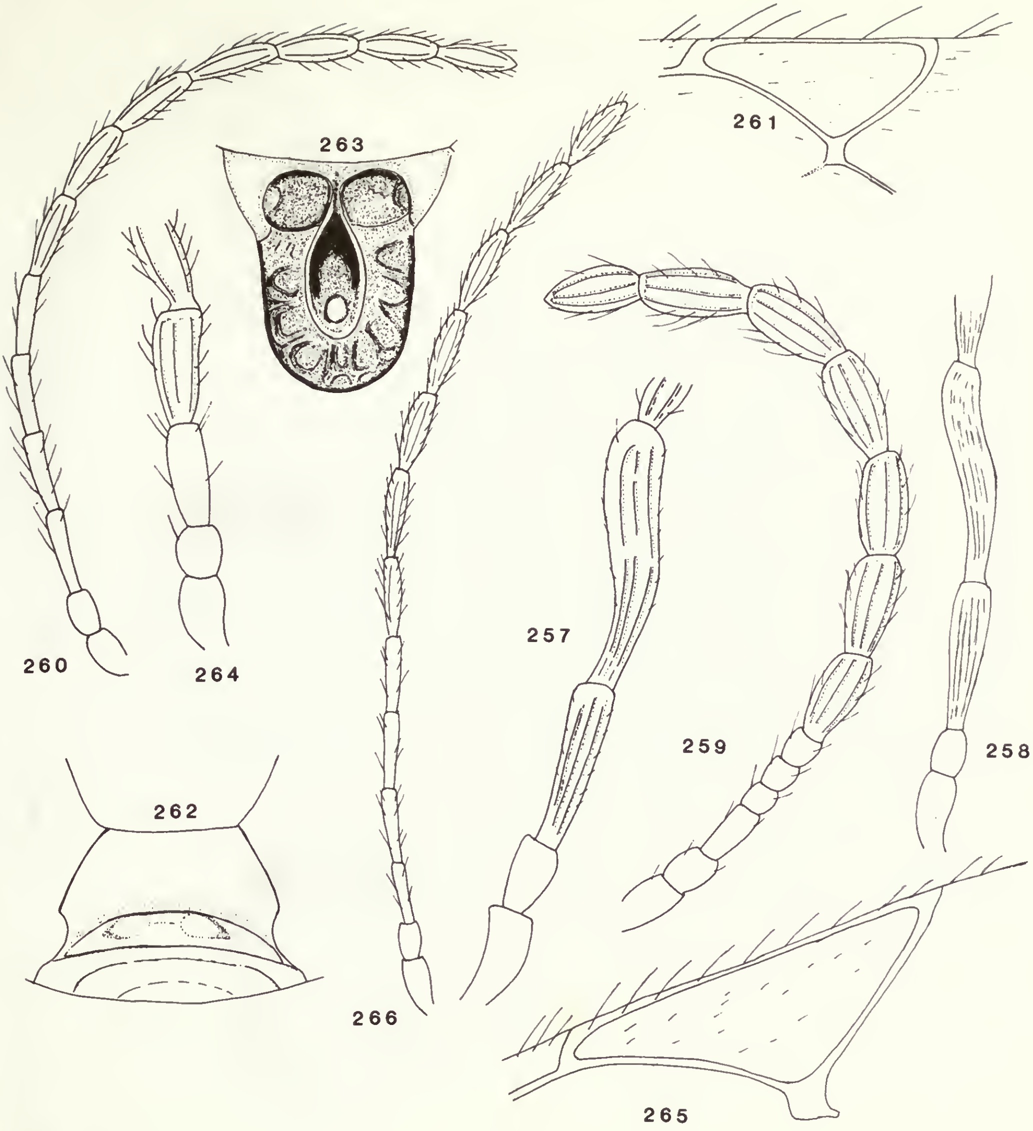

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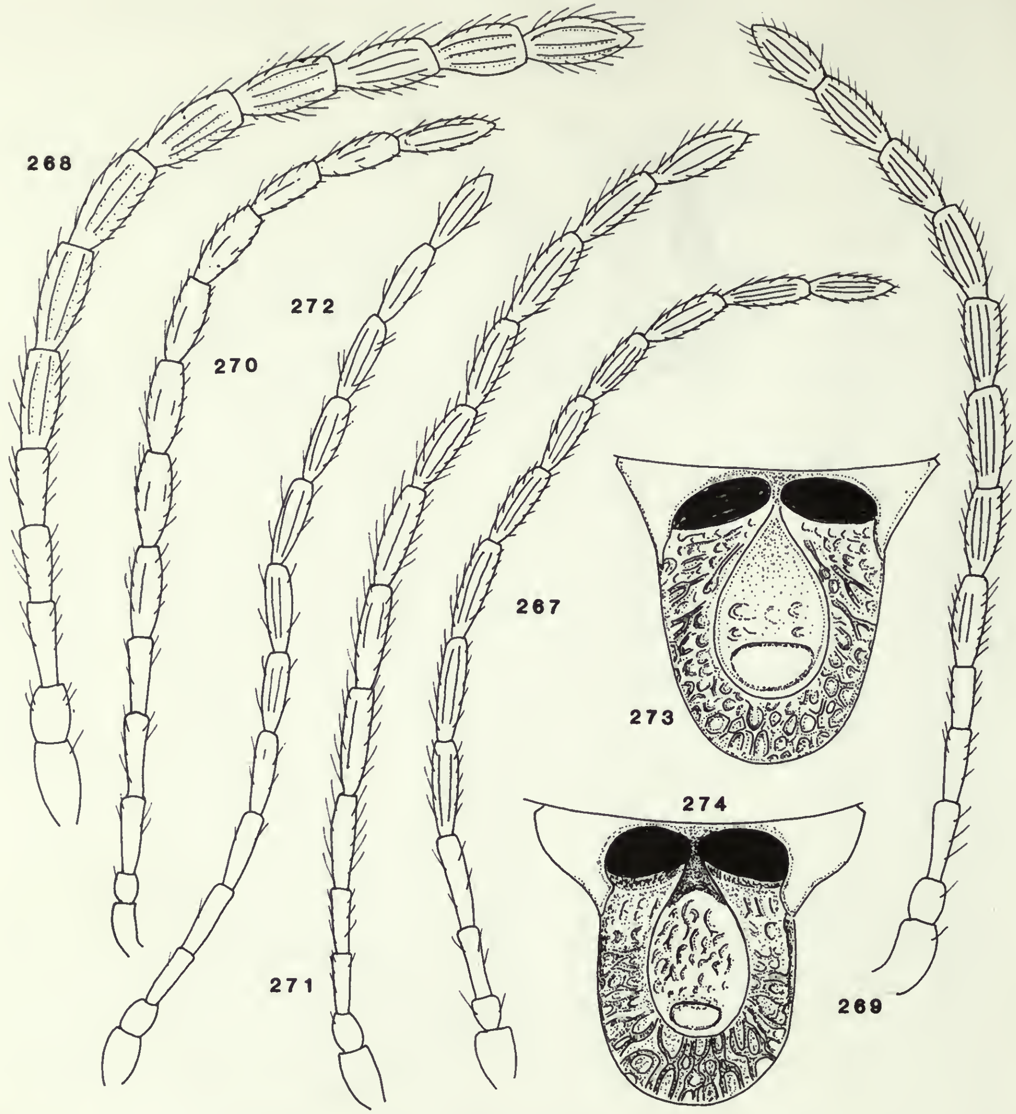

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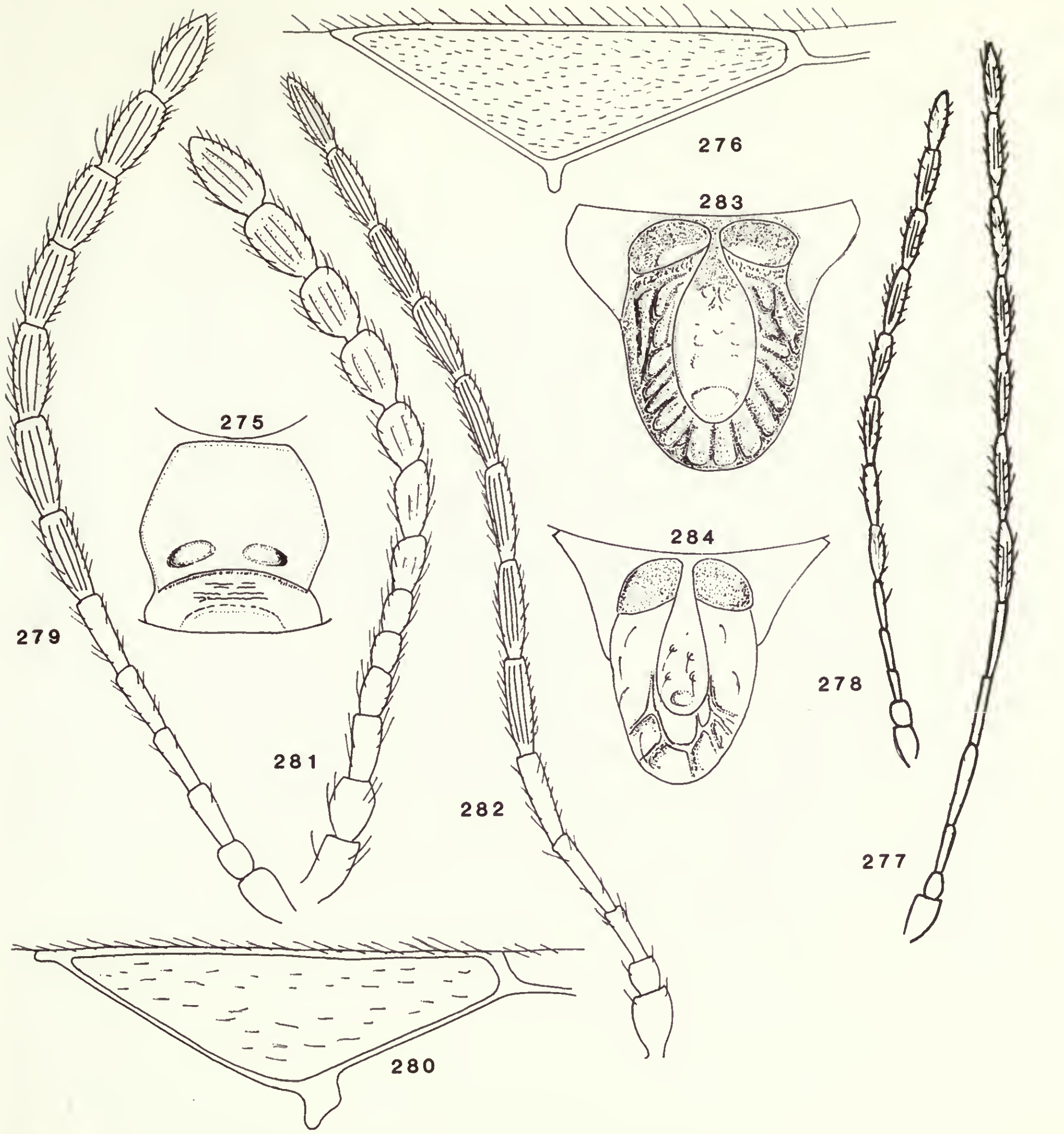

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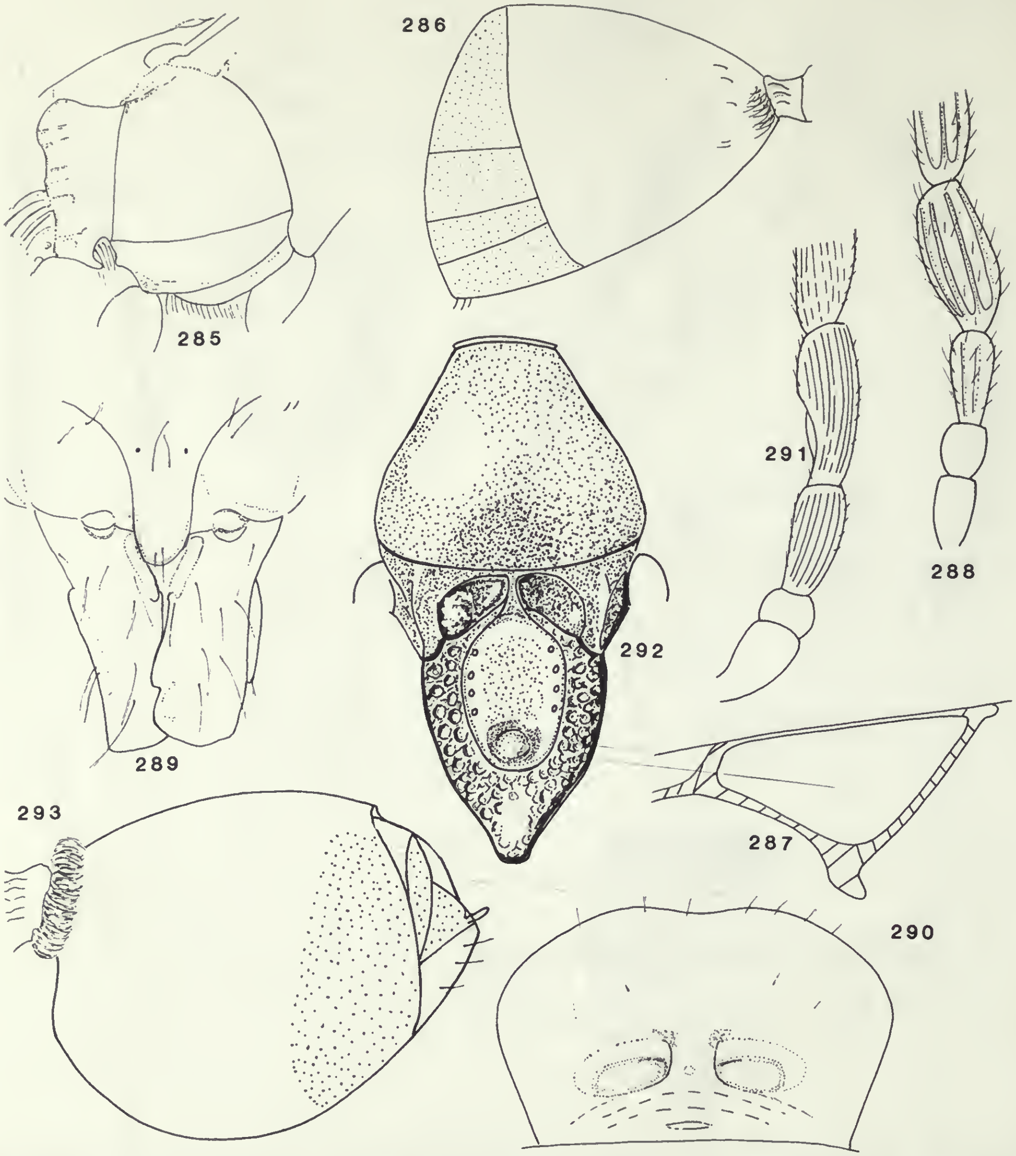

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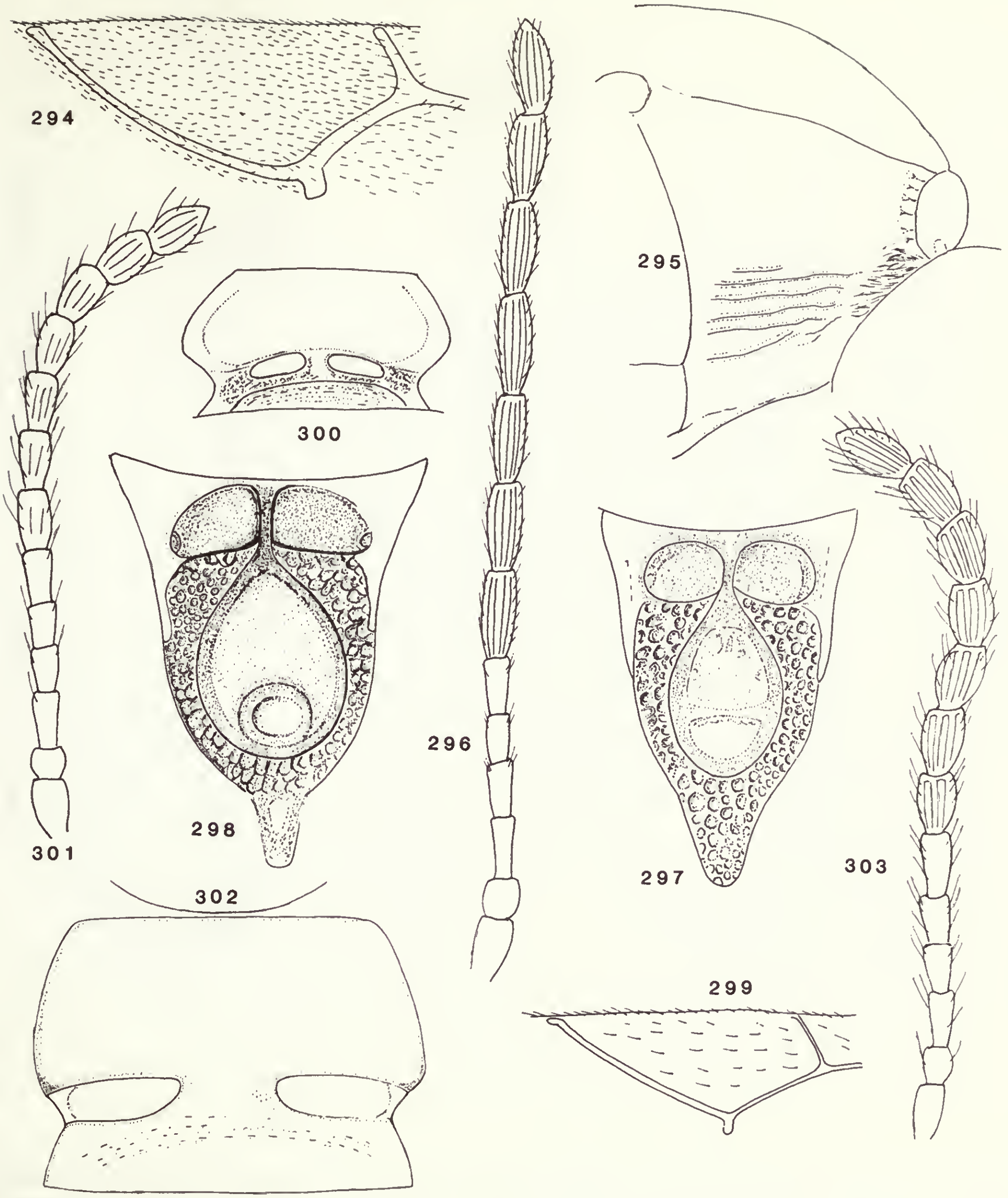

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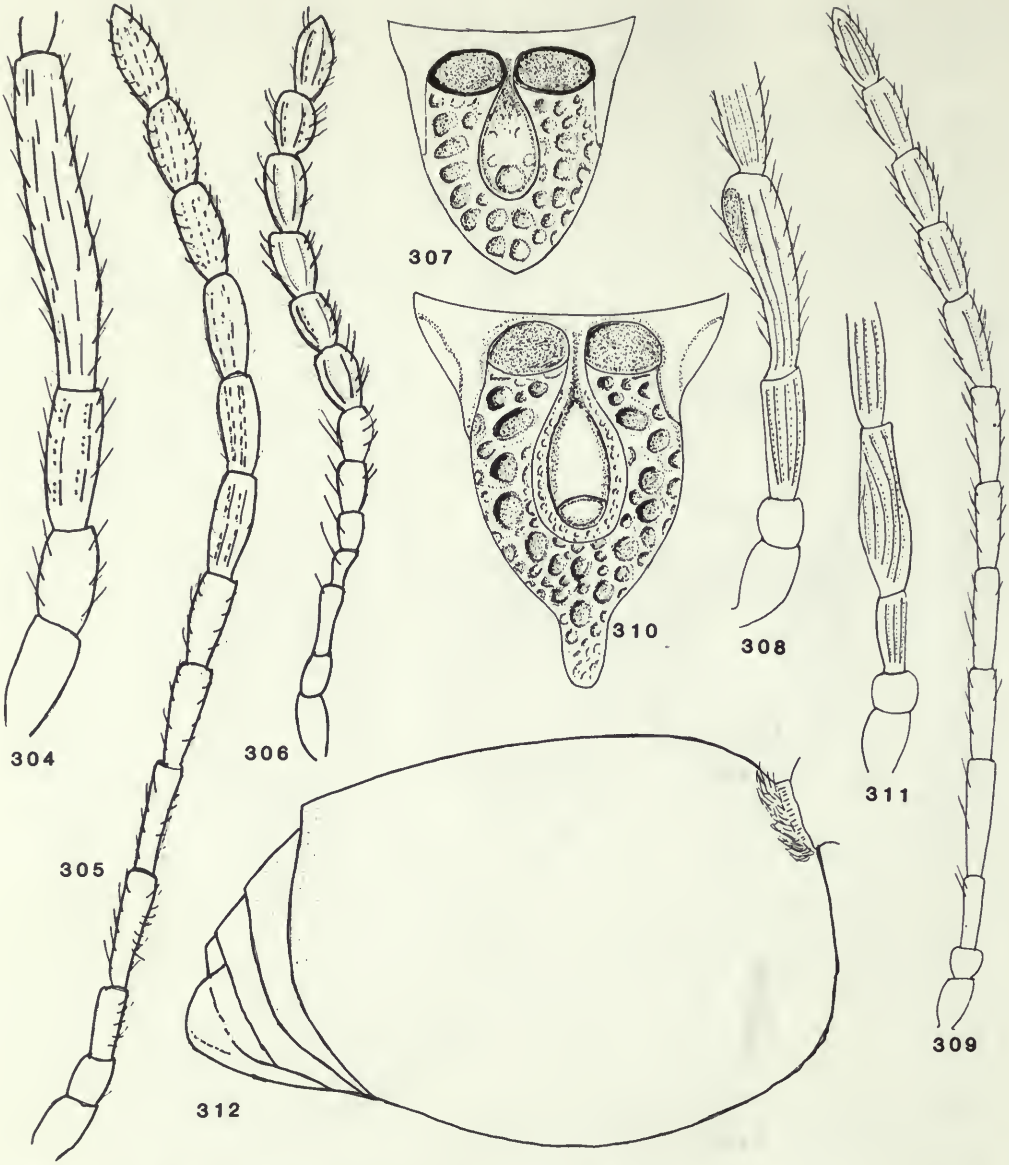

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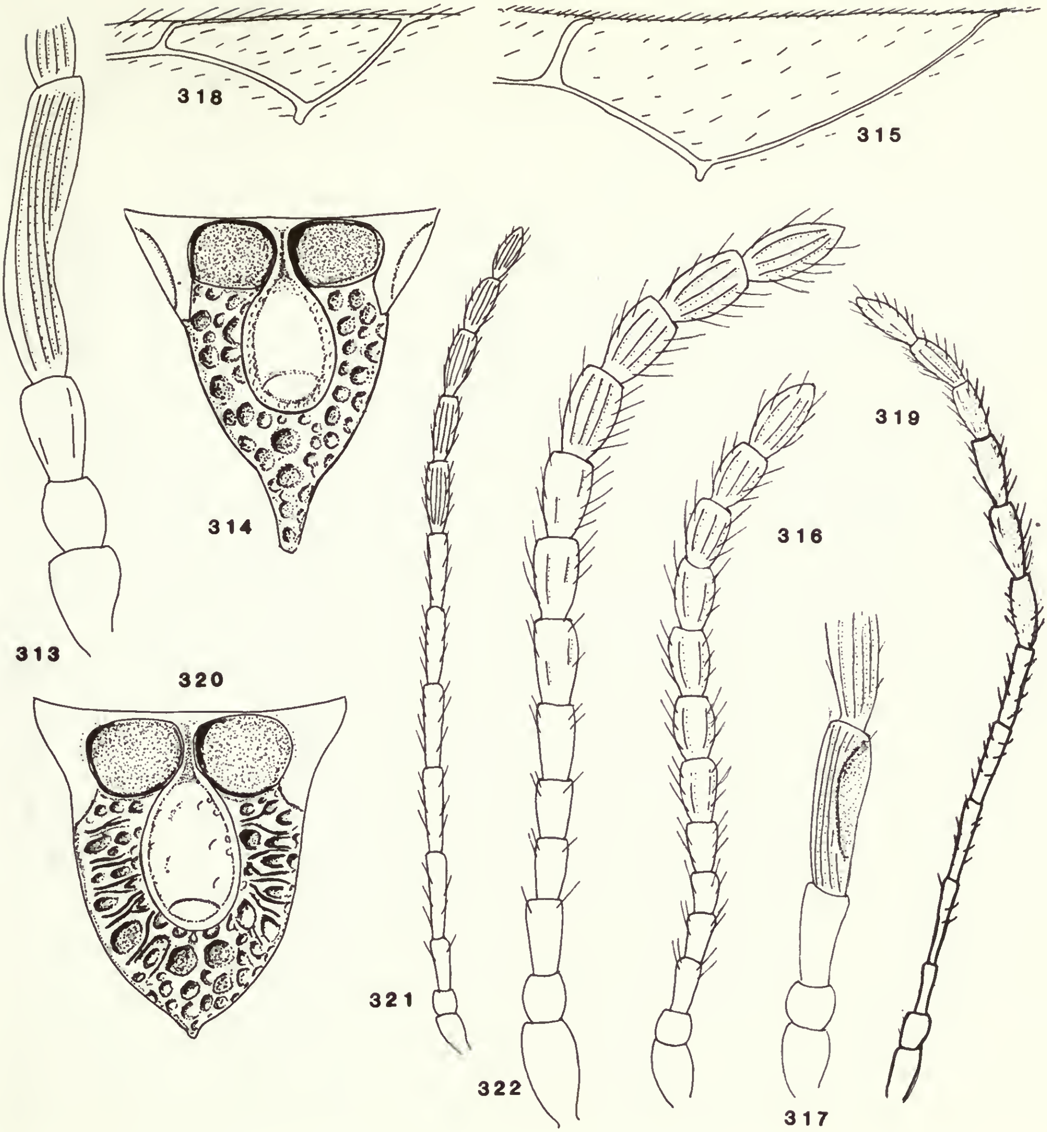

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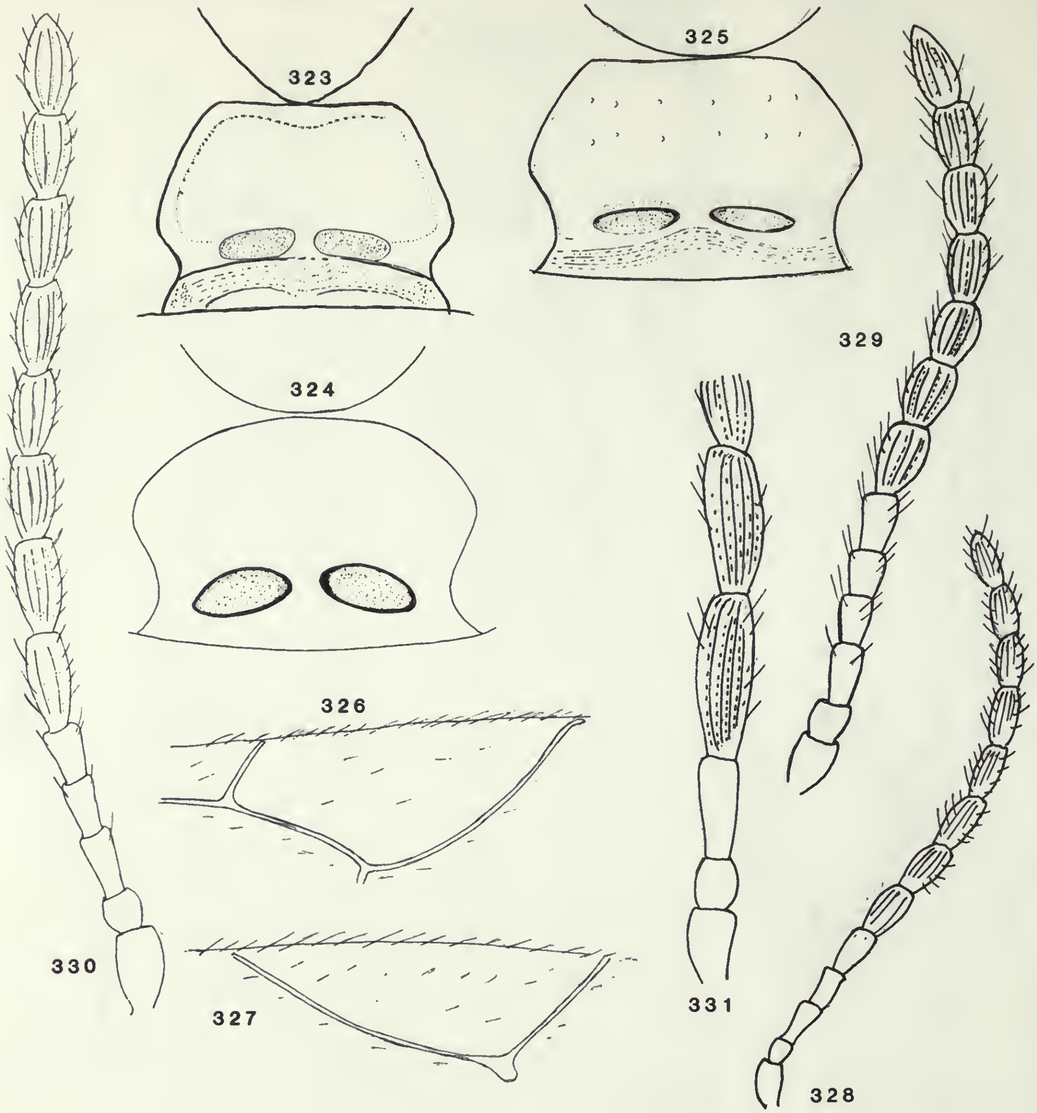

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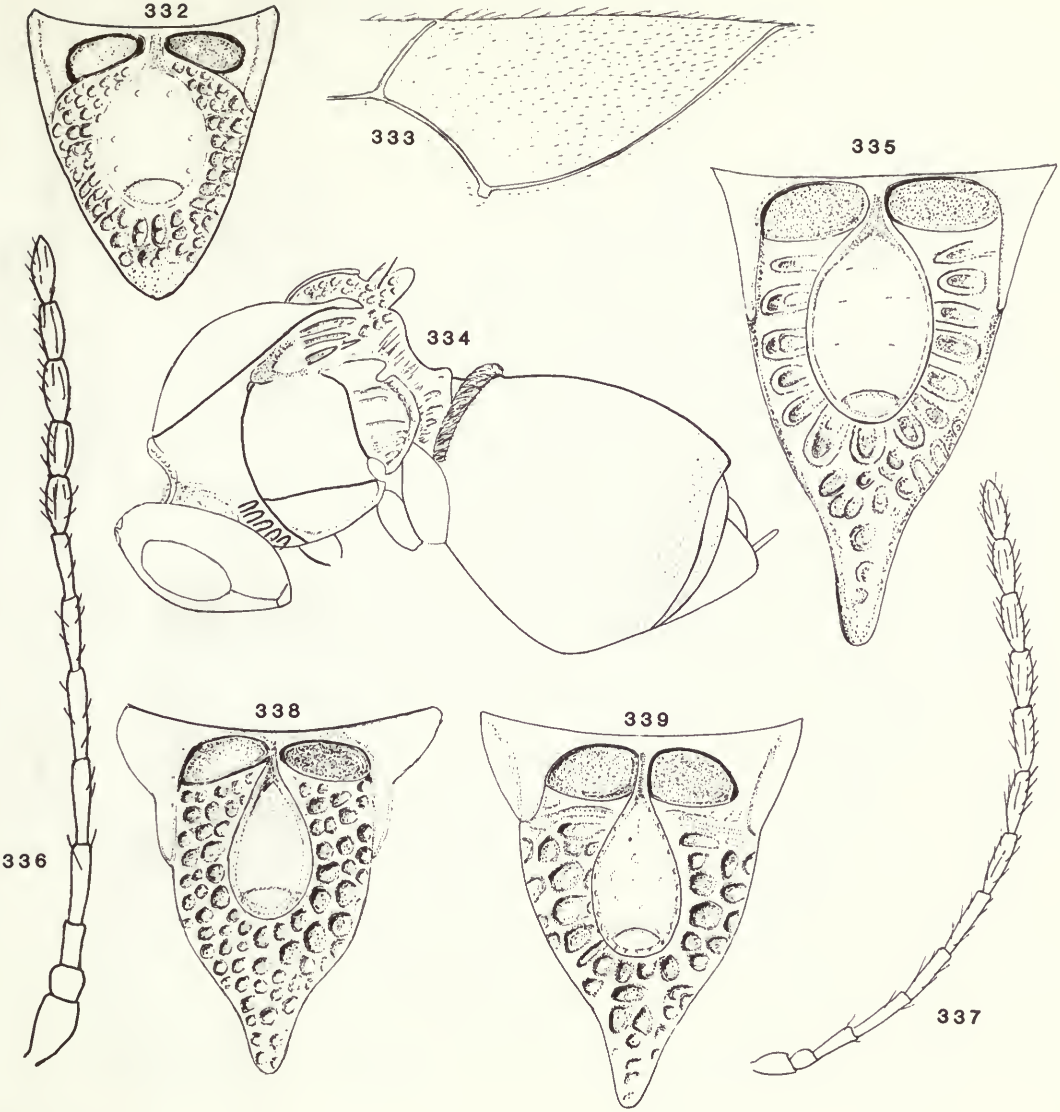

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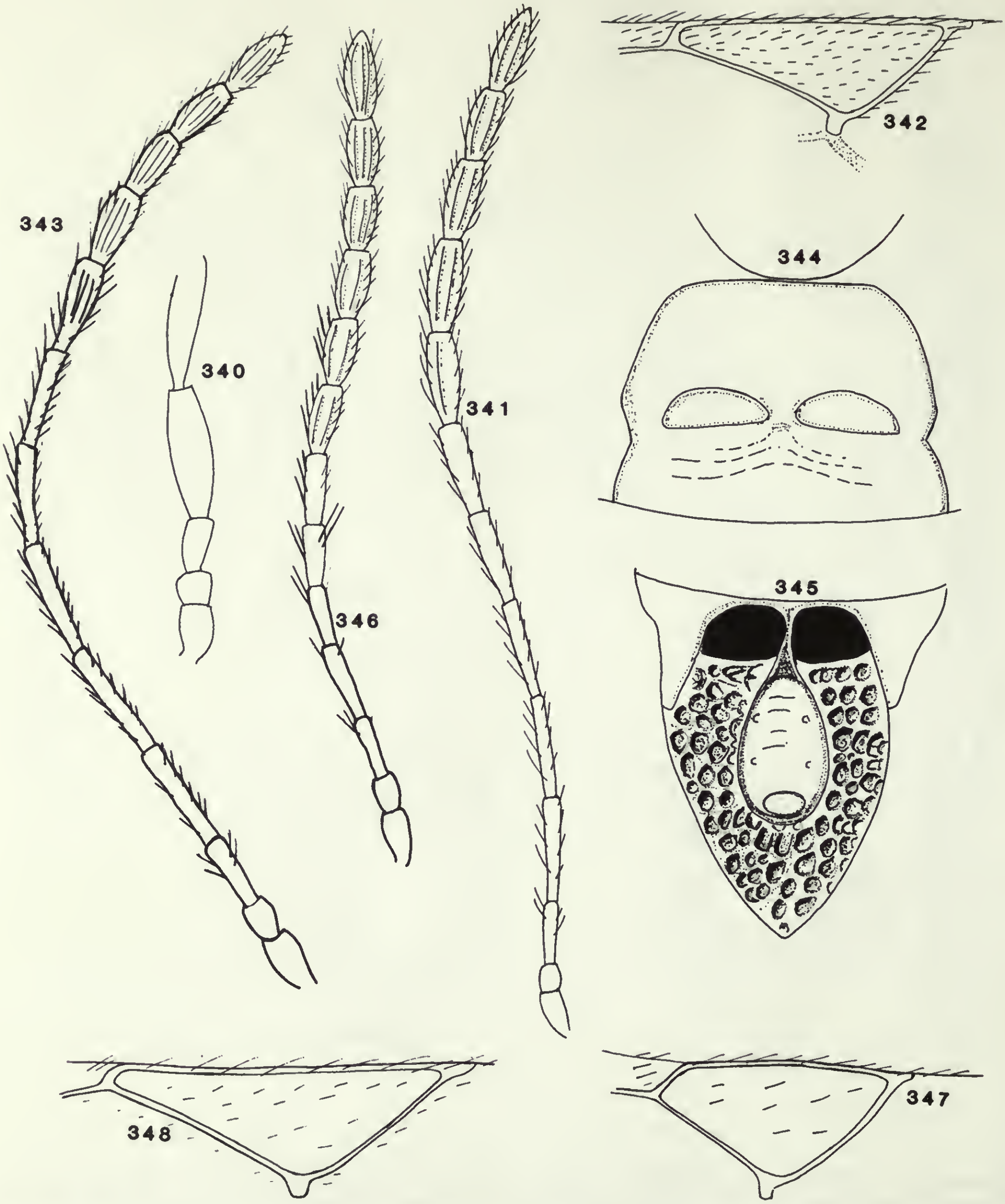

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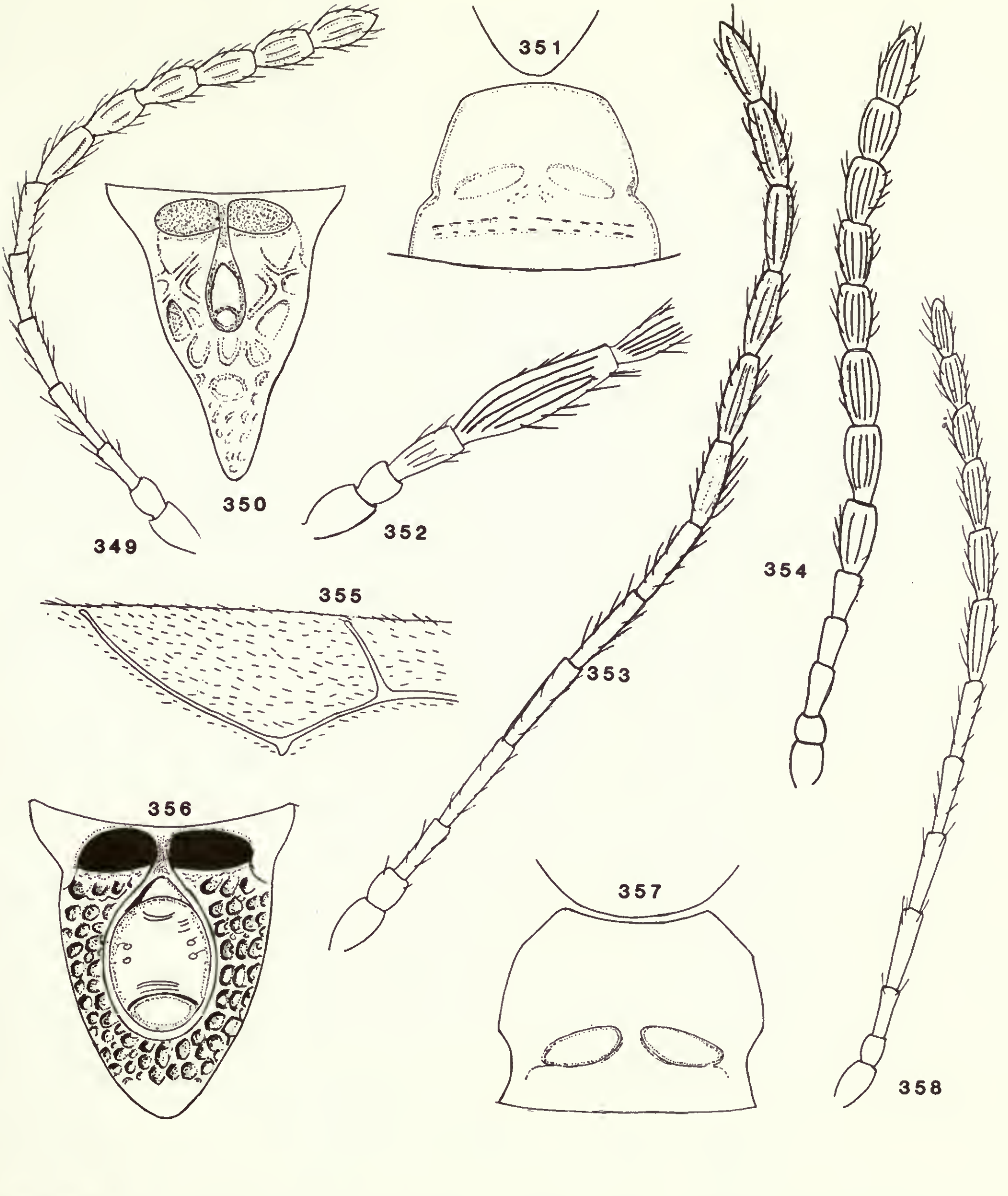

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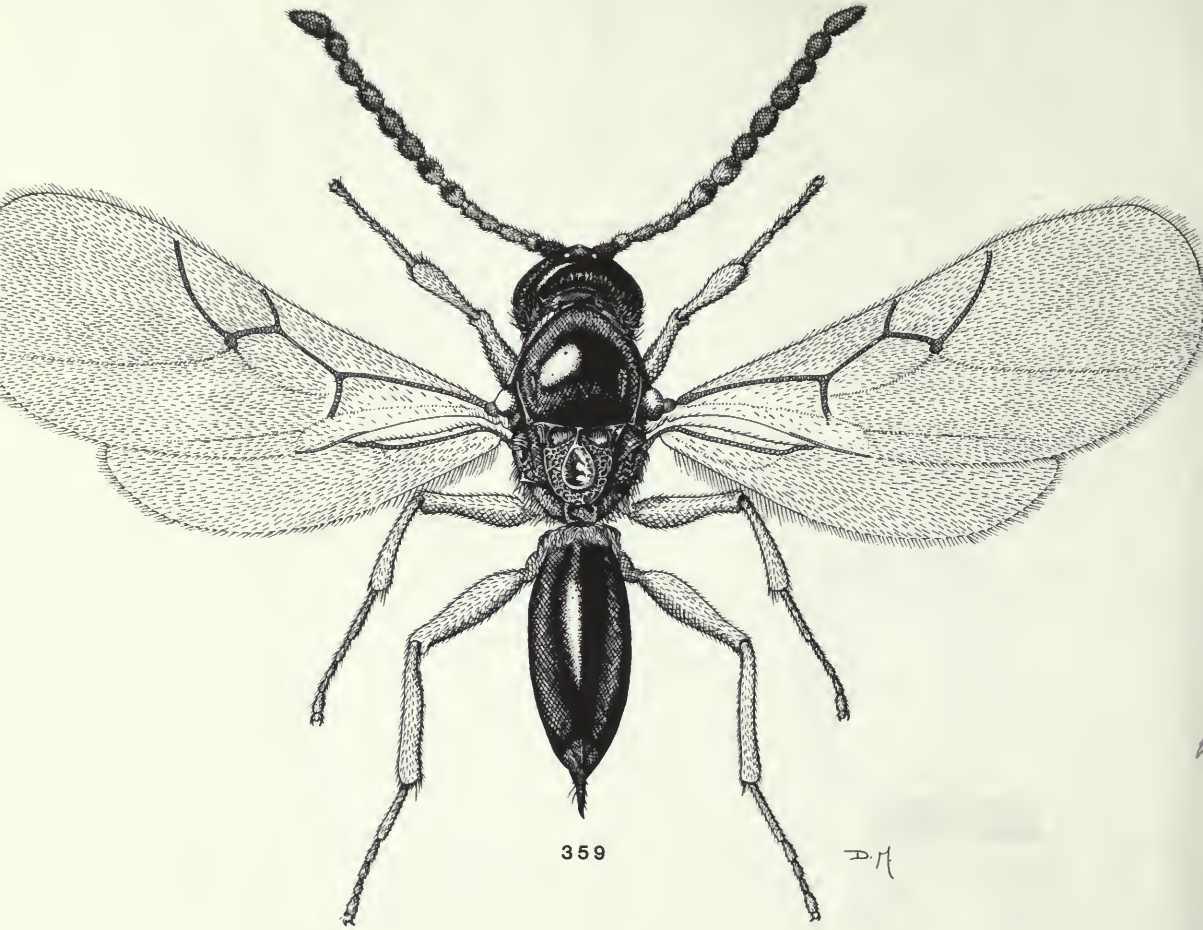

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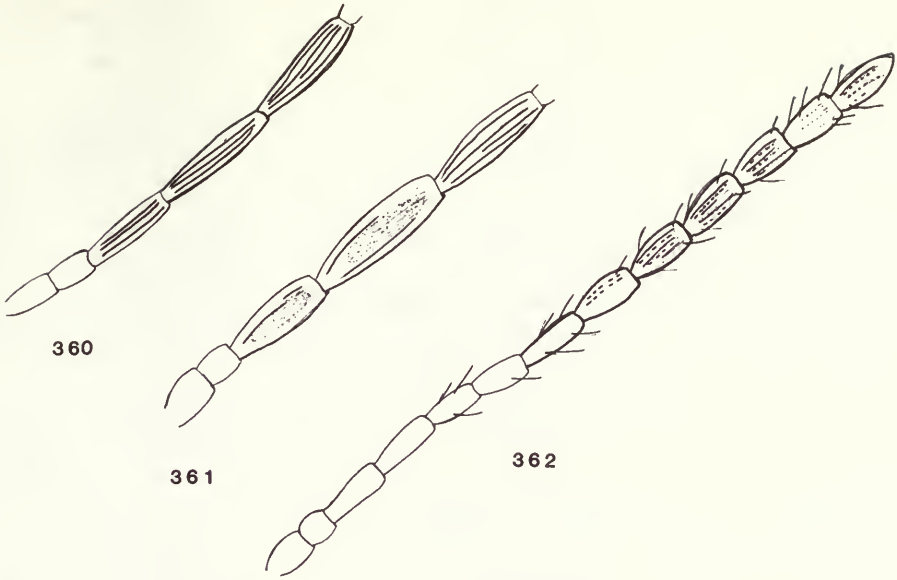

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